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ABSTRACT

Summaries of 433 doctoral, master's and staff studies in the field of industrial education reported during 1956-59 are listed in alphabetical order by author. Each notation lists author, title, degree and date, institution, pagination, library availability of the study and microfilm availability. Each summary gives briefly the purpose of the study, source of data and method of study, and findings and conclusions. A listing of authors of doctoral studies summarized in VT 011 370 (1930-1955), and a subject index to both documents is also included. Related documents are available as VT 011 369-VT 011 370 in this issue. (GR)

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Trade and Industrial Education Series No. 72

Research in Industrial Education

Summaries of Studies 1956-1959
with
Subject Index to Studies Listed in Research in Industrial Education—Summaries of Studies 1930-1955

Prepared by
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In cooperation with the Research Committee
of the National Association of Industrial
Teacher Educators

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Abraham A. Ribicoff
Secretary
Office of Education
Sterling M. McMurrin
Commissioner

FOREWORD

JUST AS RESEARCH is the cornerstone of modern industry, it is basic also to the development and maintenance of effective industrial education programs. Athough there has been considerable research in the field of industrial education, there is still a great need for further research. Individually, members of the National Association of Industrial Teacher Educators have actively stimulated and provided leadership in research in their various States. In addition, the association itself has encouraged the dissemination of information on research studies.

Recognizing the profound effect that research has on developing and maintaining sound programs of industrial education, the Division of Vocational Education, with the cooperation of the Research Committee of the National Association of Industrial Teacher Educators, published Vocational Division Bulletin No. 264, *Research in Industrial Education: Summaries of Studies, 1930–1955*. As a result of the contribution of this earlier publication and the need expressed by many educators for similar information about subsequent studies, this bulletin, including summaries of 433 studies for the 4-year period, 1956–59, has been produced. It should be helpful to those seeking literature in the field as a basis for further research or for information and solutions to present problems in industrial education.

JAMES H. PEARSON,
Assistant Commissioner
for Vocational Education.

PREFACE

AN ADEQUATE PROGRAM of research is important in all phases of modern society. Likewise, it is important that sound industrial education programs be operated with the benefit of research findings if the challenges of this technological society are to be met by the young people and adults who are the products of such programs. It is imperative, therefore, that information regarding research studies be made readily accessible not only to persons engaged directly in research, but also to educators at the policy, supervision, and instruction levels.

This publication includes the following sections:

PART I—Summaries of doctoral, master's, and staff studies reported during the period 1956–59, in alphabetical order by author.

PART II—A list by author of the doctoral studies summarized in Vocational Bulletin No. 264, *Research in Industrial Education: Summaries of Studies, 1930–1955.*

PART III—A subject index of the studies summarized in part I and of all the studies included in the 1930–55 publication.

Acknowledgments

The compilation of this report is the result of the work of many people, among them the members of the Research Committee of the National Association of Industrial Teacher Educators, who have gathered and edited the studies from the various colleges, universities, State departments of education, and other sources. Members of the committee at the time this bulletin was compiled:

WALTER C. BROWN (Chairman), University of Missouri
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In addition, the following men have served as members of this committee for one or more years since the former research bulletin was published:

- E. B. **Blanton**, North Texas State College
- **Elroy** W. **Bollinger**, New York State Department of Education
- **Charles** R. **Crumpton**, University of Louisville, Kentucky
- A. T. **Hamilton**, U.S. Office of Education
- **George** F. **Henry**, Colorado State University
- R. **Lee Hornbake**, University of Maryland
- H. H. **London**, University of Missouri
- F. E. **Robinson**, State University of New York

The Office of Education expresses appreciation to personnel at the University of Missouri for compiling the summaries of studies included in this publication and for compiling the index. Special mention is due Walter C. Brown, chairman of the research committee; H. H. London, professor of industrial education; David L. Jelden, research associate in industrial education; and research assistants Carl R. Bartel, Harlan L. Scherer, William P. Spence, and M. D. Williamson.

John P. Walsh, *Director,*
Trade and Industrial Education Branch.

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PART I

Summaries of Studies, 1956-59

Note: L. indicates that the study is available at the library of the institution mentioned; * indicates that the study is available on microfilm.

DOCTORAL STUDIES

3802. **ABRAHAM, ANSLEY ALLYN, Sr.** ***An Investigation of the Interaction of Freshmen With Their Curriculum in the School of Education at Florida A & M University.*** **Ed. D. 1956, Indiana University, 213 p. L.* (Bloomington).**

Purpose of Study: To ascertain the relation between the ability of freshmen and the difficulty of their curriculum in the School of Education at Florida A & M University.

Source of Data and Method of Study: Data were obtained by administering to 192 freshmen the Otis Quick-Scoring Mental Ability Tests: Gamma Test, Form AM; Nelson-Denny Reading Test for College and Senior High Schools, Form A; Purdue Placement Test in English for College and Senior High Schools, Form A; Kuder Preference Record, Vocational, Form B; Bell Adjustment Inventory, Student Form; and a student questionnaire as well as high school and college freshman grades.

Findings and Conclusions: High school grades rendered the most measurement value for counseling. In terms of socioeconomic and educational backgrounds and adustment to college life, passing students appeared to be much better off than were failing students. Many students who had ability to do at least "C" work were doing less.

3803. **AINSWORTH, CHESTER B.** ***Relation of Industrial Arts Instruction to Practices Followed by Adults in the Selection, Care, and Use of Tools.*** **Ed. D. 1956, University of Missouri, 130 p. L. (Columbia)***

Purpose of Study: To ascertain practices followed by adults, with and without industrial arts instruction, in the selection and care of common hand and power tools and their use in and around the home, to see if there was a significant difference.

Source of Data and Method of Study: Personal interviews with 100 men who had graduated from 6 central Missouri high schools from 1935 to 1945 and who had continued to reside in these communities. Participants had had no shop instruction beyond high school and worked in occupations which did not involve the sale or use of tools. Group A, consisting of men with 2 or more years of industrial arts instruction, was compared with group B, men who had had no industrial arts instruction.

Findings and Conclusions: Interviewees with industrial arts instruction expressed significantly more interest in working with tools, and owned more good-quality hand tools than those lacking such instruction. They followed better practices in cleaning tools and performed more jobs with tools involving maintenance on lawn mowers and automobiles. No significant differences were found between the groups with respect to the following: criteria used in the selection of tools; number of power tools owned; number of workshops developed; practices followed in tool repair, maintenance, new construction, and home improvement. The increasing number of home owners attempting do-it-yourself projects would profit from adult classes involving the selection, care, and use of common hand and power tools.

3804. ARNOLD, WALTER MARTIN. *Federal-State Cooperative Activities in Vocational Education.* Ed. D. 1957, Oklahoma State University, 223 p. L. (Stillwater)

Purpose of Study: To identify, select, define, and assemble specific mandatory and voluntary cooperative activities that should continue to exist or be newly established between the Vocational Division of the U.S. Office of Education and the State boards for vocational education.

Source of Data: Federal, State, and local leaders in vocational education. A checklist was developed and evaluated by a jury of vocational educational leaders.

Findings and Conclusions: Seventy-eight cooperative activities in seven different classifications—administration, supervision, teacher education, instructional materials, physical facilities, public relations, and research—were identified as important joint actions in which the Federal office and State boards might participate.

3805. BARTEL, CARL RAY. *Origin, Development and Work of the American Vocational Association.* Ed. D. 1959, University of Missouri, 517 p. L. (Columbia)*

Purpose of Study: To trace the historical development of the American Vocational Association from 1906 to 1959, to record the major details of its origin, and to describe the work of the Association in the promotion of practical arts and vocational education.

Source of Data: The proceedings of conventions, reports of committees, minutes of business and executive meetings, official publications of the American Vocational Association and its parent organizations, and pertinent texts, periodicals, and bulletins.

Findings and Conclusions: The National Society for the Promotion of Industrial Education was formed at New York City on Nov. 16, 1906, and reorganized on Feb. 23, 1918, forming the National Society for Vocational Education. The Vocational Education Association of the Middle West was organized at Chicago on Jan. 16, 1914. The initial step to form the American Vocational Association was taken by the National Society on Dec. 4, 1925, and the final step by the Middle West Association on Mar. 20, 1926. As the American Vocational Association grew in membership, financial resources, and prestige it produced publications, increased its services to members and nonmembers, cooperated with other national organizations, and actively sponsored legislation concerning vocational education. Through the years it has been largely operated by practical arts and vocational education interests of the East and Middle West. It has not secured the membership of many reimbursable teachers or a great percentage of practical arts teachers.

3806. BENSON, WILLARD A. *Measurable and Observable Factors in the Selective Retention of Doctoral Candidates With Special Implications for Industrial Education.* Ed. D. 1959, Wayne State University, 247 p. L. (Detroit, Mich.)*

Purpose of Study: To identify subjective factors used in the selection of doctoral students specializing in industrial education and to evaluate statistically the objective measures used in the selection of Ed. D. students at Wayne State University.

Source of Data and Method of Study: Graduate records at Wayne State University and personal interviews with educational leaders from nine major universities.

Findings and Conclusions: No one pattern of selection is equally acceptable to all schools for selecting doctoral students in education. Wayne State University doctoral students who ultimately complete all degree requirements make significantly higher scores on three standardized tests than students who are unsuccessful in the doctoral program. It is possible to establish weighted values (based on past records) for each of these tests to provide maximum separation between the successful and unsuccessful groups of students.

3807. BIEDLER, JOHN SAMUEL. *The Recreational Function of Industrial Arts.* Ph. D. 1958, The Ohio State University, 157 p. L. (Columbus)

Purpose of Study: To establish and spell out a position for industrial arts in recreation.

Source of Data and Method of Study: Documentary research was used to define (1) recreation in contemporary life and (2) industrial arts education, and to clarify the role of each. A criterion for measuring man's recreational activities was developed with reference to the involvement of industrial arts. This was used to support the hypothesis that industrial arts activities are involved in some of man's recreational activities and to reveal content and direction for expanding industrial arts education in recreation.

Findings and Conclusions: Recreation can take place during work or leisure; industrial arts training can guide an individual in recognizing recreational opportunities and in increasing his skills in making use of these opportunities. Growth through self-expression characterizes industrial arts, a form of creativity which adds meaningful contributions to the advancement of the culture. The recreational function should be stressed at all levels of education.

3808. BIGGAM, WILLIAM RUSSELL. ***Instructional Aids in Industrial Arts Education.*** **Ed. D. 1958, Bradley University, 137 p. L. (Peoria, Ill.)***

Purpose of Study: To ascertain the importance and need for training in the selection and use of instructional aids in the preservice and inservice professional education of industrial arts teachers, to study the methods provided for such training, and to suggest college course content in instructional aids.

Source of Data: Questionnaires on practices and opinions were sent to 142 teacher trainers, 138 supervisors, and 239 secondary school teachers of industrial arts. Related literature on audiovisual education and industrial arts education was reviewed.

Findings and Conclusions: Forty-two colleges and universities provide special courses in instructional aids which are offered largely on an elective basis and most frequently at the undergraduate level. Opinions of industrial arts educators: Graduates are not sufficiently prepared to utilize the variety of instructional aids; a need exists for training on the professional level; training is best provided by special courses; courses should be practical; and training should be broad and comprehensive. A wide variety of aids are used by secondary school industrial arts teachers in varying frequency, but conventional aids are used most often. Industrial arts supervisors use a great variety of aids in inservice training and encourage greater uses of these aids on the part of shop teachers.

3809. BLACK, RALPH ROSS. ***Administrative Problems of Production in the High School Print Shop.*** **Ed. D. 1959, Bradley University, 197 p. L. (Peoria, Ill.)**

Purpose of Study: To survey present practices regarding production work in high school print shops and to ascertain methods of alleviating the situation where production is considered a major problem.

Source of Data: Questionnaires sent to approximately 500 high school printing instructors throughout the United States. Questions were designed primarily to elicit information concerning the role of production work in the graphic arts programs of the schools. Comparisons were made between those who considered production a major problem and those who did not.

Findings and Conclusions: Production work for other departments of the school was found to be almost a universal practice in high school print shops, but only about one-third of the instructors considered it a major problem in the shop. Instructors were almost unanimous in their approval of the use of production work in their industrial arts classes, provided it could be properly controlled. Lack of a workable plan for controlling production appeared to be instrumental in making it a problem in many shops. This condition seemed to be due principally to the inability of the instructor to organize effectively for production work, or to a lack of cooperation between the administrator and the printing instructor.

3810. BOHN, RALPH CARL. ***An Evaluation of the Educational Program for Students From Foreign Countries: Emphasis Upon Orientation Procedures, Individual Problems, and Psychological Variables.*** **Ed. D. 1957, Wayne State University, 351 p. L. (Detroit, Mich.)***

Purpose of Study: This study was designed as a pilot investigation into the effectiveness of the foreign student program directed by the Technical Training Section of the U.S. Office of Education and financed by the "Point Four" Program.

Source of Data and Method of Study: The evaluative methods consisted of personally studying a pilot group of 36 students, including interviews and a questionnaire completed anonymously by the students, and the use of the following instruments: Language tests developed by the Committee on Diagnostic Reading Tests, Inc., California Test of Mental Maturity, an attitude scale based on Stephenson's Q-technique, a questionnaire to faculty advisors, and further information from institutions attended by the students.

Findings and Conclusions: A weakness in language ability was evident from the language tests given the group and was corroborated by the faculty advisors and by the students themselves. Because of this language deficiency, the California Test of Mental Maturity provided little or no information concerning the native ability or intelligence of the students. Their attitudes tended to be favorable toward the United States and toward permissive rather than restrictive education. The grades of the foreign students were generally equal to or better than the grades of American students. The major problems encountered while in the United States were language difficulty, housing during the summer seminar, difficulty in adjusting to American food and to the different climatic conditions.

3811. BOWMAN, JAMES E. *A Study of the Basic Mathematical Skills Needed to Teach Industrial Arts in the Public Schools.* Ed. D. 1958, Michigan State University, 194 p. L. (East Lansing)*

Purpose of Study: To ascertain the mathematical skills needed to be a successful industrial teacher in the public schools: as those needed in the required college courses, and those used while teaching industrial arts.

Source of Data: Surveys from 162 colleges, 100 professors of drafting, 63 professors of electronics or electricity, 105 professors of metalwork, 101 professors of woodwork, 49 authors of industrial arts textbooks and 189 outstanding industrial arts teachers representing 40 States. Percentage responses were used in comparing the desirable courses in mathematics.

Findings and Conclusions: College industrial arts professors recommended these courses, in order: elementary algebra, plane geometry, trigonometry, college algebra, solid geometry, intermediate algebra, and analytic geometry. The first five courses were recommended by over 48 percent of the professors. More than one-half of the outstanding industrial arts teachers included in this study had taken elementary algebra, plane geometry, intermediate algebra, solid geometry, college algebra, and trigonometry.

The authors of industrial arts textbooks recommended that the following courses be required for students who use their books: plane geometry—80 percent; solid geometry—65 percent; elementary algebra—54 percent; trigonometry—44 percent.

3812. BRENHOLTZ, HAROLD ROBERT. *An Analysis of Certain Factors Associated With Chartered Non-Accredited Schools in Missouri.* Ed. D. 1957, University of Missouri, 175 p. L. (Columbia)*

Purpose of Study: To analyze the structure and activities of the unaccredited private schools of Missouri chartered since 1925 under the laws relating to nonprofit benevolent, religious, scientific, educational, and miscellaneous associations.

Source of Data: Five separate sources—from the charters of the 136 corporations considered, from 33 corporations by means of information forms and personal contact, from the files of the Veterans and Adult Education Section of the State department of Education, from the files of the Better Business Bureau of Kansas City, and from an analysis of the catalogs and other literature published by some of the corporations.

Findings and Conclusions: The procedure for granting charters for nonprofit private schools has not been restrictive or discriminating enough to prevent the chartering of substandard or fraudulent schools. Institutions with low enrollment and few teachers have offered and awarded various degrees, including nine different types of "Doctor's" degrees, some of them awarded for correspondence study only. Minimum standards need to be established concerning the quantity and quality of work required for the awarding of degrees by nonprofit private schools. These schools should be required to meet proper standards regarding the adequacy of physical facilities and the competency of instructional staff.

3813. BYROM, JOHN MARVIN. *The Development of a Scale of Photographs for the Appraisal of Learning Influences in Industrial Arts Shops.* Ed. D. 1957, Pennsylvania State University. 173 p. L. (University Park)*

Purpose of Study: To develop a scale of photographs for appraisal of learning influences in industrial arts shops, and to develop evaluative criteria to parallel the scale.

Source of Data and Method of Study: The evaluative criteria were developed from existing information, experimentation, and refinement of data by leaders in the field. The scale of photographs was developed by taking many photographs in 49 industrial arts shops. The photographs were separated into 20 factors and submitted to judges for ranking in 4 degrees of effectiveness. The photographs for the scale were then selected by statistical calculations. A reviewing committee was used for cross-validation.

Findings and Conclusions: Photographs can be used to show conditions, situations, and happenings in industrial arts shops that are significant in depicting the quality of certain learning influences. A scale of photographs can be developed which may be used for the appraisal of learning influences in industrial arts shops.

The methods used in this study suggest a practice of collecting evidence that can be easily stored or filed for future use by educators.

3814. CAIN, CECIL RICHARD. *An Analysis of the Industrial Arts Teaching Position and Teacher Preparation.* Ed. D. 1958, Indiana University, 207 p. L. (Bloomington, Ind.)

Purpose of Study: To analyze the instructional and related requirements of the industrial arts teaching positions now held by persons who graduated from Fort Hays Kansas State College, Hays; Kansas State Teachers College, Emporia; and Kansas State Teachers College, Pittsburg; and to compare the requirements with the preparation these teachers received.

Source of Data: Responses to 21 major items included in an interview guidesheet were obtained during personal interviews with 135 subjects. Information concerning certification and credit hours of preparation was obtained from the files of the State Department of Public Instruction. The data were compiled and analyzed under the following headings: (*a*) teacher qualification, training, and activities; (*b*) instructional program, scope, and area combinations; (*c*) shop equipment; and (*d*) ranking of objectives.

Findings and Conclusions:

(1) Wide variations in the preparation of the teachers, both in scope and in number of hours of credit in the various areas of industrial arts, indicated a diversity of requirements among the three teacher training institutions as to the type and amount of training considered desirable in the preparation of industrial arts teachers;

(2) The predominance of drafting, metalwork, and woodwork in the program of course offerings at each of the grade levels pointed to a strong emphasis upon the traditional areas of instruction;

(3) Courses in administration and supervision apparently were not required as a part of the preparation of industrial arts teachers;

(4) There were 71 instances, involving more than one-third of the group, in which the teachers had assumed instructional responsibilities in subject-matter fields for which they lacked the minimum subject preparation stipulated for the class of school in which they taught. This seemed to indicate that formal preparation was subject to variable interpretation by the State board of education in the determination of the teacher's qualifications in the industrial arts teaching field.

3815. CLAUSEN, JOHN NORMAN. *The Effect of an Entrance Requirement on Success in Selected Engineering Courses: An Experimental Evaluation for the School Year 1953–54 in the College of Engineering, Institute of Technology, University of Minnesota.* Ph. D. 1955, University of Minnesota, 256 p. L. (Minneapolis)

Purpose of Study: To ascertain the effects of solid geometry on learning outcomes in freshman courses in engineering drawing.

Source of Data and Method of Study: Data were obtained experimentally during the school year 1953–54 utilizing a sample of 348 randomly selected and assigned students matriculating the fall quarter in the College of Engineering. Three experimental treatments were applied. These can be defined in terms of whether or not a student had taken solid geometry prior to completing the courses, Engineering Drawing 4 and 5. Data were collected for the students on five measures: high school scholastic rank; pretest and post test for Engineering Drawing 4; pretest and post test for Engineering Drawing 5.

Findings and Conclusions: Within the limits of the design of this investigation, the experimental factor, solid geometry, effected superior learning outcomes in Engineering Drawing 4. With respect to the findings pertaining to Engineering Drawing 5, it was concluded that solid geometry generally did not effect superior learning and that further investigation is warranted.

3816. CRAWFORD, HAROLD WAKELING. *Organizational Patterns for Industrial Education Programs in Selected Land-Grant Colleges.* Ed. D. 1960, Wayne State University, 155 p. L. (Detroit, Mich.)*

Purpose of Study: This study sought to determine what should be the organizational pattern for industrial education programs in the selected institutions.

Source of Data: The catalogs of the selected institutions; the proceedings of the meetings of the Southern Association of Colleges and Secondary Schools; the American Association of Land-Grant Colleges and State Universities; and the Conference of Presidents of Negro Land-Grant Colleges (now defunct). Persons interviewed at each of the selected institutions, using a tape recorder, included the president, dean, industrial education head, and a teacher of industrial education selected by the department head. Open-ended questions were used for the structured interviews.

Findings and Conclusions: The needs of the several States that support these institutions differ to the degree that no organizational pattern for industrial education is appropriately common to these 17 institutions. Desegregation tends to influence the organizational patterns for industrial education by increasing or decreasing the need for programs in the service area within the State. Terminal technical programs were not in demand at the time of this study.

The major objective of industrial education programs in the selected institutions was teacher education. Industrial teacher education programs can be provided best in cooperation with other teacher education programs but free from domination by the administrators and supervisors of those programs. Industrial teacher education programs share in a coordinated plan for supervised teaching and make use of general courses in teacher education. There is a move in the selected institutions to separate industrial education and engineering.

3817. CUMMINS, CARL CLINTON. *An Analysis of Student Personnel Practices in Selected Industrial Arts Teacher Education Institutions.* Ed. D. 1957, University of California, 276 p. L. (Los Angeles)

Purpose of Study: To analyze student personnel practices in the industrial arts departments of nine colleges in California accredited to recommend for the special secondary teaching credential.

Source of Data: A comprehensive review of the literature of authorities in student personnel work in higher education; a questionnaire survey of 548 industrial arts majors in selected institutions, personal interviews with a representative sample of 30 industrial arts teacher educators, a descriptive review of the practices employed, and a synthesis of the data.

Findings and Conclusions: Agreement is widespread among authorities concerning a point of view or pervasive philosophy for student personnel work in higher education. Attention is directed to the student's well-rounded development—physically, socially, emotionally, and spiritually, as well as intellectually. No standard plan for student personnel work prevails in the selected departments, although teacher educators agree that it is their responsibility to participate in the orientation, counseling, records, selection, recruitment, student activities, placement and followup. The author concludes with specific findings for each of these areas.

3818. DANOVITZ, SAUL. *The Relationship of Certain Educational Experiences in the Secondary School to Achievement in Industrial Success and Leisure Time Activities in Later Life.* Ed. D. 1957, University of Pittsburgh, 127 p. L. (Pittsburgh, Pa.)*

Purpose of Study: To show the relationship of certain educational experiences in the secondary school to achievement in industrial success and leisure-time activities in later life.

Source of Data and Method of Study: The equivalent-groups method of comparison was employed. The primary sources of data were the apprentice records of the Aluminum Company of America, New Kensington Works, and a questionnaire mailed to all former apprentices of the Company.

Findings and Conclusions: The vocational graduate had greater success in the completion of the apprentice training program and in shopwork and attained the same level in mathematics as that attained by the nonvocational graduate. Although no major difference was noted in leisure-time activities in later life, slight variations did appear between the groups. The attitude toward the apprentice training program was approximately the same for both groups. The majority of the apprentices felt that the training program was worthwhile.

3819. DAVENPORT, JOE UNDERWOOD. *An Analysis of the Status and Needs, With Suggestions for Improvement, of Industrial Arts Education in the Public Secondary Schools of Arkansas.* Ed. D. 1959, University of Arkansas, 225 p. L. (Fayetteville)*

Purpose of Study: To ascertain the status of industrial arts education in Arkansas; to examine the effectiveness and needs of existing programs; to ascertain the nature of plans in progress for the improvement and expansion of industrial arts programs; and to make recommendations for further improvement.

Source of Data: All schools in the State having programs of industrial arts were visited. Information blanks were filled out by school administrators, teachers, and pupils in each school offering industrial arts. Questionnaires were mailed to 200 schools not offering industrial arts to determine their plans for the future, and the responses were analyzed.

Findings and Conclusions: Industrial arts was taught by 64 teachers in 46 schools in 25 districts in Arkansas in 1958–59, to an enrollment of 6,298 students. Three industrial arts teachers had no degree; 46 held the bachelor's degree; and 13 had completed requirements for the master's degree. Salaries of industrial arts teachers ranged from less than $3,000 to over $5,000, with a median of approximately $3,800. Salaries of teachers with the master's degree averaged about $900 higher than those with the bachelor's degree. Salaries of teachers with no degree were about $900 less than the salaries of those with the bachelor's degree. Of the schools offering industrial arts, 62.5 percent offered general shop courses. Twenty-two percent of the schools that did not offer a program in industrial arts reported plans being made to offer such a program.

3820. DECK, WILLIAM LUTHER. ***A Resource Research in Electricity.*** **Ph. D. 1955, The Ohio State University, 273 p. L. (Columbus)**

Purpose of Study: To trace the development of electricity and its value and application to areas of industrial arts, agriculture, medicine, science, and health. To develop a proposed program for industrial arts teacher education with emphasis on electricity.

Source of Data: Bibliographical methods were used, including books, pamphlets, and periodicals. Experimentation was used to find new ways of presenting the technology to the students. Personal interviews were made with many persons in the electrical field. Induction and deduction were used in arriving at conclusions. Questionnaires were used to ascertain the semester hours offered in electricity by industrial arts teacher-education institutions. Personal observations of electrical laboratories were made.

Findings and Conclusions: Electricity should be taught at all levels: elementary through adult. Administrative officers at State and local levels need to clarify their appreciation of electricity and the need for it in the schools by making explicit recommendations as well as by arranging for the necessary funds. Teacher educators should clarify their purposes to offer better programs and work towards better standardization. Literature in the field must be developed; such development should be stimulated by industrial arts consultants and teachers. Refresher and inservice courses will need to be offered.

3821. DOANE, RAYMOND CHARLES. ***Industrial Education in Selected State Schools for the Deaf.*** **Ed. D. 1956, University of Missouri, 231 p., L. (Columbia)***

Purpose of Study: To ascertain the status and need for industrial education at State schools for the deaf of the upper Mississippi Valley region.

Source of Data: Data concerning industrial education programs at schools for the deaf were obtained from official records, observation, and interviews. Data concerning the occupational status of male graduates of schools for the deaf were obtained through information forms mailed to them and to their employers. Ratings on occupational success of the graduates were obtained from the employers. Suggestions for the improvement of training programs were obtained from both groups of respondents.

Findings and Conclusions: Guidance and placement services, an inservice teacher education program, on-the-job training, and up-to-date facilities are needed at schools for the deaf. The occupational success of graduates, in the trade for which they were trained, compares favorably with that of other employees who have been employed on similar jobs for approximately the same length of time; hence, employers need not be reluctant to employ deaf workers.

3822. DOBSON, CLIFFORD GEORGE. ***A Study of Apprentices Enrolled in Related Instruction Classes in California Public Schools.*** **Ed. D. 1956, University of California, 287 p. L. (Los Angeles)**

Purpose of Study: To gather and evaluate information on the characteristics of apprentices in the various apprenticeship programs in the State of California that would reveal the status of the program and provide an index for the measurement of future developments and trends.

Source of Data: A questionnaire distributed to 1,610 selected apprentices enrolled in related instruction classes in the public schools of California. The sample included apprentices in 22 trades from 100 classes in 40 school districts.

Findings and Conclusions: The apprentices in this survey were largely in their early twenties with a high school diploma, married, fathers, and from families of skilled workers. Most had heard little about apprenticeship training while in high school. Over 50 percent attended apprenticeship classes 2 nights a week. The California State Department of Education Instructional Materials Laboratory was said to have a strong influence on the program. Few of the group were recruited and selected on the basis of a well-organized program. Joint apprenticeship committees evaluated the progress of apprentices every 6 months.

3823. EDDY, EVAN MAX. ***General Related Instruction Needed by Students in Cooperative Occupational Training.*** **Ed. D. 1956, University of Missouri, 154 p. L. (Columbia)***

Purpose of Study: To ascertain the general related instruction currently provided students in cooperative occupational training, the importance of the instruction in terms of the needs of cooperative trainees, and additional instruction needed but not currently provided.

Source of Data: General related instructional materials from 10 States were assembled and analyzed for instruction topics, which were placed in an information form and evaluated by respondents representing eight populations—local employers, former trainees, local coordinators, local labor leaders, personnel directors, regional labor leaders, coordinators from several States, and teacher educators and State supervisors. The report was based upon 706 completed forms representing 29 States. Respondents wrote in the topics of additional needed instruction.

Findings and Conclusions: In general, instruction topics concerned with choosing and preparing for a career, getting and adjusting to the job, personality and personal progress, and employer-employee relations were considered of greatest importance. Less importance was attached to topics concerning labor laws, problems of management and business ownership, and labor unions. Topics were rated highest by local coordinators, local labor leaders, and former trainees; teacher educators and State supervisors, personnel directors, and regional labor leaders were more critical of current instruction. Concern was expressed about duplication in related classes of instruction offered in general education classes. A need was indicated for an expansion of the instruction concerning employer-employee relations. Areas of instruction that have implications for guidance and counseling were considered most important and it was indicated that coordinators should have professional training in guidance and counseling to perform their duties effectively.

3824. ENSMAN, LEO M. *Relation of Interests, Ability, Courses Taken, Scholastic Achievement, and Other Factors to Success in Industrial Arts Teaching.* Ed. D. 1957. University of Missouri, 139 p. L. (Columbia)*

Purpose of Study: To ascertain the relation between teaching success as rated by supervisors of 110 beginning industrial arts teachers graduated from Kansas State Teachers College, Pittsburg, and factors such as general and precollege background, college preparation, selected interests, mental abilities, and the school, community, and teaching assignment.

Source of Data: Data secured from records in several offices at Kansas State Teachers College were tabulated and chi-square tests calculated.

Findings and Conclusions: The beginning teacher group was rated as quite successful. Individuals with high marks, greater number of hours in various areas, and other factors concerning college preparation received highest ratings. Interests, mental abilities, and general and precollege background, taken separately, had little or no relation to teaching success. Teachers with science minors and those who began teaching in schools with an enrollment of under 500 received significantly higher ratings. Successful, as well as unsuccessful, teachers seemed to be leaving the teaching profession. The factors studied, in combination, or other factors, not identified, appeared to be affecting the ratings more than these same factors taken separately.

3825. FARR, WILBUR JAMES. *Educational Needs of Urban Residents Concerning the Use of Electricity in the Home.* Ed. D. 1958. University of Missouri, 136 p. L. (Columbia)*

Purpose of Study: To ascertain the educational needs of residents in urban communities concerning the use of electricity in the home, in order that school authorities may have evidence upon which to organize electrical instruction in high schools and in adult education programs.

Source of Data: An interview schedule used in a series of 200 interviews with the male parent of secondary school students.

Findings and Conclusions: The uses of electricity in the home as follows: heat, rotary power, light, communications, control, chemical effect, and electronics. There are minor repairs and maintenance jobs in the home which do not require the services of a skilled technician. Boys, girls, and adults should be trained to perform unspecialized tasks that contribute to the upkeep of the home. Adults in urban communities generally would like to learn more about the selection, operation, and care of electrical equipment and about planning for the uses of electricity. Instruction should be provided by the public high schools for boys and girls on the fundamentals of electricity, the selection and purchase of electrical equipment, minor repairs, and planning for the use of electricity. This can be a vital portion of the school program, teaching the related theories and principles in terms of the everyday experiences of the student.

3826. FAULDS, VINCENT R. *Technical Training Needs of Selected Arkansas Industries.* Ed. D. 1956, University of Missouri, 144 p. L. (Columbia)*

Purpose of Study: To ascertain the need for trained technicians in selected Arkansas industries, and whether or not existing educational institutions in the State are meeting the need.

Source of Data: The 159 employers in 19 selected Arkansas industries who returned usable information forms mailed to them, analyses of U.S. Census reports and literature in the field, and personal interviews with employers and educators in Arkansas.

Findings and Conclusions: The selected industries are playing an increasingly important role in the economy of Arkansas. Existing educational institutions of the State are not doing an adequate job of technical training to meet the needs of these industries. The need for trained technicians in Arkansas is sufficiently large to justify the establishment of additional technical curriculums in the State. Facilities now exist within the educational institutions of the State which could be utilized in establishing such curriculums.

Existing training facilities and technical employment patterns suggest rather definite geographical locations for technical curriculums in Arkansas.

3827. **FIKE, IRIS LINN.** ***Historical Development of Vocational Industrial Education Programs of Secondary Grade Level in Public Schools of Pennsylvania From 1900 to 1954.*** **Ph. D. 1956, University of Pittsburgh, 245 p. L. (Pittsburgh, Pa.)***

Purpose of Study: To trace the development of vocational industrial education of secondary grade level in Pennsylvania.

Source of Data: Federal and State laws; legal opinions and decisions related to vocational industrial education; statistical, annual, and biennial reports of the Superintendent of Public Instruction in Pennsylvania; and the *Pennsylvania School Journal.*

Findings and Conclusions: Vocational trade and industrial education classes and schools developed slowly in the decade following the passage of the first vocational education acts. Early emphasis in Pennsylvania was placed upon classes related to the mineral industries. However, training in the three general trade areas of machine shop, electrical shop, and auto mechanics became the most popular in terms of pupil enrollment, district participation, teacher employment, and money expenditure. Legislation has been modified as experience has shown need.

3828. **FISHER, RICHARD E.** ***Status of and Need for Terminal Vocational-Technical Curricula in Senior Colleges and Universities.*** **Ed. D. 1956, University of Missouri, 151 p. L. (Columbia)***

Purpose of Study: To ascertain the status of and need for terminal vocational-technical curriculums in senior colleges and universities, and what factors contribute most to the development and popularity of such curriculums.

Source of Data: Information forms containing data pertinent to the study were received from 78 colleges and universities in 39 States. Literature in the field of junior and senior college organization and administration, including college bulletins and catalogs, was reviewed for information and data.

Findings and Conclusions: The subject fields most commonly served by terminal curriculums in senior colleges and universities are secretarial science and industrial education. Entrance requirements are similar in both terminal and degree curriculums. Accreditation of curriculums, transfer of credit, and general education present important issues. The attitude of faculty members and administrators at senior colleges toward terminal curriculums appears to be a more serious deterrent to their development and success than is the opinion and attitude of students. In view of the high mortality rate from degree curriculums, the critical shortages of skilled and technically trained manpower and the impending wave of students seeking entrance to college, it appears that senior colleges and universities, along with junior colleges and technical institutes, should make more provision for terminal curriculums.

3829. **FOSS, MAURICE FELKER.** ***Implications for Industrial Arts Teacher Education from Case Studies of Selected Teachers.*** **Ed. D. 1958, University of Cincinnati, 484 p. L. (Cincinnati, Ohio)***

Purpose of Study: To determine the personal, social, experiential, situational, and educational factors involved in the adjustment to teaching of a selected group of graduates of the Industrial Arts Department of Miami University, Oxford, Ohio.

Source of Data: The data examined included entrance tests, high school transcript, application for admission, college grade record, placement bureau data, and health service record. Each teacher was observed during a half day of teaching, and interviews were held with the teacher and his superintendent or principal.

Findings and Conclusions: Personal goals and attitudes are the most important elements in teaching success. Superior teachers came to college to prepare to teach; they chose their college program because of its reputation in its field. They were regarded as being "conscientious," "getting along with others," and "liking children." They expressed an interest in "working with children," "the subject matter of industrial arts," and "a belief in the school as an instrument of society." They were chosen by administrators of superior schools who believed in the subject matter. Children in their classes were effectively busy and interested in their work.

Less satisfactory teachers showed higher A.C.E. scores but lower achievement test scores and college grade records. They lacked the interest and work habits of the superior teachers; their classes showed less interest, accomplished less, and had poor personal relations. School administrators, as a group, possessed a narrow concept of the function of the industrial arts program.

3830. FURLONG, JOHN. *Case Studies of Beginning Trade and Industrial Instructors in a Vocational Evening School.* Ph. D. University of Minnesota. 1957, 413 p. L. (Minneapolis)

Purpose of Study: To discover, through the use of a concentrated case-study technique, the problems and accomplishments of beginning instructors teaching trade and industrial evening classes in a large metropolitan vocational school.

Source of Data: Pertinent literature, interviews with teachers, classroom observations, and student ratings of their instructors.

Findings and Conclusions: Generalizations based on the individual cases: The lack of an effective planned system of instruction adversely effected the quality of teaching done by the instructors; there was little teacher-planned motivation to develop the students' interest in what was to be learned; personal relationships between supervisory personnel and teachers were excellent; the instructors desired a record and evaluation of their progress and achievement; they were continually faced with the problem of tardiness; they had no uniform preservice teacher training; insufficient attention was paid to the work needs of the students; there was wide range in the classroom opportunities for students to use what they learned in class; the instuctors were highly competent in their knowledge of the field they were teaching, and most students believed they received worthwhile instruction.

3831. GILBERT, HAROLD G. *An Industrial Arts Teacher Education Program for Elementary Schools.* Ph. D. 1955, The Ohio State University, 234 p. L. (Columbus)

Purpose of Study: To ascertain (1) the need for elementary classroom teachers with industrial arts training and the responsibility of industrial arts consultants, (2) the teacher-education experiences that might best qualify industrial arts specialists for elementary school training, and (3) the teacher-education experiences that might best qualify elementary teachers to use industrial arts experiences.

Source of Data: (1) A questionnaire to administrators and (2) teacher placement records, to ascertain the need for specialists and consultants in industrial arts on the elementary level. An analysis was made of the work of industrial arts specialists in 16 schools in New York and experiences for preparing such specialists were recommended.

Findings and Conclusions: The basic industrial arts program to prepare a consultant should include the scientific study of children as well as the organization of elementary schools and methods of initiating and enriching classroom activities. Work in manufacturing, construction, power, transportation, communication, and management as well as development of physical settings. Full-time student teaching under a consultant.

Problems to be included in the elementary education program to prepare industrial arts specialists include the above plus the definition of industrial arts.

3832. GISRIEL, AUSTIN E. *The Development and Analysis of an Instrument Designed to Measure Work Attitudes, Using Selected Groups of Students and Employees.* Ed. D. 1959, University of Maryland, 301 p. L. (College Park)*

Purpose of Study: To develop an instrument designed to measure general work attitudes of employees and to ascertain general factors, specific understandings, knowledge, and feelings that may have affected the employee's work attitudes.

Source of Data and Method of Study: A review of the literature was made, and from various definitions of work attitudes an instrument was developed, consisting of assorted items that could possibly affect an employee's work attitudes. The instrument was pretested and refined and then tested on a sample of 103 employees. The instrument was validated by correlating it with the immediate supervisor's rating of an employee's work attitudes on an overall rating scale.

Findings and Conclusions: The reliability of the instrument was found to be consistent with the reliabilities of similar instruments designed to measure various kinds of attitudes. The split-half reliability coefficient for 87 cases on the field test group was 0.744, corrected by the Spearman-Brown formula to 0.853.

The instrument was validated by comparing the rating of the employee with the rating by their immediate supervisors using the over-all scale, Scale A. An adjusted contingency coefficient of 0.46 indicated the magnitude of the relationship. A complete evaluation of this instrument would require further and more extensive study with respect to different kinds of employees, supervisors, and employment organizations.

3833. GLAZENER, EVERETT RUTHVEN. *An Experimental Determination of the Value of Selected Visual Aids in Teaching Beginning Mechan-*

ical Drawing. Ed. D. 1958. Pennsylvania State University, 136 p. L. (University Park)

Purpose of Study: (1) To determine the differential effects of two techniques of instruction in beginning mechanical drawing at the junior high school level. (2) To investigate the value of selected visual aids (not including film) during the first 18–27 clock hours in teaching drawing and whether selected visual aids enable students to increase their achievement of manipulative technique in certain units of a first course in mechanical drawing.

Source of Data: With the assistance of a jury, certain visual aids applicable to the selected units were chosen and constructed for use in all experimental classes. During the spring semester of the school year 1956–57, 14 controls and experimental classes of beginning mechanical drawing in 4 junior high schools in Pennsylvania were used.

Findings and Conclusions: Some of the conclusions were: (1) Certain results tend to support the hypothesis that the achievement of students in selected units of beginning mechanical drawing is greater when selected visual aids are utilized in addition to traditional methods; (2) when comparing results of the control and experimental groups in the criteria with the pretest mental age, the experimental group made more progress than the control group; (3) there appeared to be more interest, more attention, more general comprehension and understanding, less noise, and more motivation and participation by students in the experimental classes than in the control classes.

3834. GOETZ, ROBERT EDWARD. *Industrial Printing Practices Compared with the Teaching of Printing in Post-High School Institutions.* Ed. D. 1958, University of Missouri, 232 p. L. (Columbia)*

Purpose of Study: To ascertain the current practices in selected graphic arts areas, the machines used in these areas, the attitudes of industry toward educational teaching methods, and how these findings compare with like factors in the post-high school institutions offering vocational courses in printing.

Source of Data: (1) Information forms mailed to 1,004 job-printing plant owners or managers of the United States having 15 or more workers engaged in graphic arts and (2) information forms mailed to all post-high school institutions in the United States offering vocational printing curriculums. Critical ratio techniques were used in handling the data.

Findings and Conclusions: The training areas in the post-high school institutions and the commercial printing areas are not closely related. The institutions seem to be slow in adopting training areas in offset printing. There is not a close relationship between practices followed in training programs for printers at the post-high school level and those used in industry. A close relationship does exist between the teaching and learning methods used by post-high school printing teachers and the acceptance of these methods by tradesmen. The institutions are providing vocational training on a minimum number of different types of machines and do not have the modern expensive printing equipment used in commercial printing plants.

3835. HAIGWOOD, THOMAS L. *A Study of Desegregation Problems That May Affect the Instructional Program of Junior High School Industrial Arts in North Carolina.* Ed. D. 1959, Pennsylvania State University, 243 p. L. (University Park)

Purpose of Study: (1) To ascertain real differences of instructional problems in junior high school industrial arts in Negro and white segregated schools of North Carolina, and segregated and desegregated schools of the border States; (2) To ascertain teachers' opinions on the actual and expected effects of desegregation on instructional problems; and (3) To study instructional practices and techniques used by successful teachers of desegregated classes.

Source of Data: Questionnaires sent to junior high school industrial arts teachers in segregated and desegregated schools.

Findings and Conclusions: Findings indicate that more serious instructional problems exist in Negro than in white segregated industrial arts programs of North Carolina. Desegregated programs have more serious problems in the border States, than segregated programs. Teachers of desegregated industrial arts programs of border States experienced a greater increase in instructional problems due to desegregation than teachers of a segregated school. Questionnaire respondents believed teachers should plan courses for wider abilities and background, have a more tolerant attitude toward Negro students, and have greater control.

3836. HAMMOND, ROBERT GROVE. *Evolving Concepts of Industrial Education in the Thinking of the Industrial Educator.* Ed. D. 1956, University of Missouri, 282 p. L. (Columbia)*

Purpose of Study: To trace the evolution of certain underlying concepts of industrial education in the thinking of industrial educators which have affected the growth and expansion of the program, and to analyze and interpret the ideas of industrial educators toward certain major issues involved in the program of industrial education as it has developed in America.

Source of Data: A study was made of the writings of persons of recognized status directly connected with the industrial education movement, and the proceedings and annals of selected organizations.

Findings and Conclusions: Industrial education, conceived as a multipurpose area of education, continues to be supported in terms of both general and vocational education. The aims and purposes of industrial education—increasing the appreciation and understanding of industrial society, vocational competency, and successful citizenship—have changed little since its introduction into American schools. Objectives cited for industrial arts have tended to become more closely aligned with, and less distinguishable from, objectives cited for other subject areas in general education. Despite phenomenal growth and popularity, relatively little stability has developed within the scope and management of the general shop. Industrial educators have been in sympathy with programs of training that increase the occupational mobility of workers. The industrial educator's concept of guidance and vocational-industrial education has gradually expanded to include these as indispensable phases of a total program of occupational adjustment.

3837. HAMPTON, ISAAC PAUL, JR. *Amateur Radio Operation in Missouri and Its Implications for Industrial Arts Education.* Ed. D. 1959, University of Missouri, 114 p. L. (Columbia)*

Purpose of Study: To ascertain important experiences, viewpoints, and activities concerning amateur radio operation in Missouri, and the implications of this hobby for industrial arts and adult education programs in Missouri.

Source of Data: An information form sent to 1,000 Missouri residents who held amateur radio operator's licenses.

Findings and Conclusions: The amateur radio hobby in Missouri has experienced considerable growth in the last decade. The average hobbyist has a better-than-average income and education when compared with all Missouri residents. More hobbyists indicated they were professional people, technicians, or high school or college students than any other occupational category. A negligible number of the respondents indicated they had received help in their radio hobby through science or industrial arts courses taken in the public school. A sizable majority indicated the opinion that the schools should expand their offerings in the fields of electricity and electronics.

3838. HANSON, DURWIN MELFORD. *Evaluation of the Veterans Administration Rehabilitation Program for Students Entering Iowa State College.* Ph. D. 1956, Iowa State College, 80 p. L. (Ames)

Purpose of Study: To investigate the academic achievement of male veteran and nonveteran students who entered Iowa State College without prior college experience.

Source of Data: The records of Iowa State College. Three groups of students were used: (1) Public Law 16 veterans, (2) Public Law 346 veterans, and (3) nonveterans. Triserial correlations, chi-square, analysis of covariance, multiple regression, and discriminant analysis techniques were employed.

Findings and Conclusions: The study revealed that Public Law 346 veteran students were superior to the other two groups while Public Law 16 students were superior to the nonveteran student.

3839. HELTON, H. L. *Evaluation in Industrial Arts Teacher Education.* Ed. D. 1958, Wayne State University, 280 p. Education L. (Detroit, Mich.)

Purpose of Study: To develop an evaluation instrument consisting of standards and criteria for the accreditation of undergraduate industrial arts teacher education programs.

Source of Data: An opinionnaire sent to the departmental chairman of 202 institutions reported to have programs of industrial arts teacher education. Chairmen were asked to rate characteristics of programs of industrial arts teacher education as essential, desirable, acceptable, undesirable, or detrimental. After the return of 82 percent of the opinionnaires, characteristics rated either essential or desirable by at least 75 percent of the respondents were selected, grouped, and written as tentative standards and criteria for efficient programs of industrial arts teacher education.

Findings and Conclusions: The significant conclusions for this study are in the form of a 25-page evaluation instrument designed for self-study by individual departments and a 4-page supplement for industrial arts being published in April 1958 as the Seventh Yearbook of the American Council for Industrial Arts Teacher Education under the title, *Accreditation in Industrial Arts Teacher Education.*

3840. HEPLER, EARL R. *Order of Presenting Orthographic Projection and Pictorial Representation and Its Effect on Achievement in Engineering Drawing.* Ed. D. 1957, University of Missouri, 205 p. L. (Columbia)*

Purpose of Study: To ascertain the relative effectiveness or superiority of teaching orthographic projection first, followed by pictorial representation, as compared with teaching pictorial representation first, followed by orthographic projection.

Source of Data: A comparison of six classes of engineering drawing which were divided into two equated groups. Groups were paired on Army General Classification Test scores, subject matter pretest scores, and secondary school drafting experience. Groups were compared on information achievement, drawing skill, ability to visualize, speed, and attitude of student toward subject.

Findings and Conclusions: Findings indicate that teaching orthographic projection followed by pictorial representation is superior to, or a more effective approach in the development of informational achievement, drawing skill, and ability to visualize. There was no significant difference found between the two methods with respect to speed developed and attitude of student toward the course.

3841. HISER, PAUL T. *The Development and Use of a Pre-Student Teaching Evaluation Procedure in Industrial Arts Teacher Education.* Ed. D. 1958, The University of Maryland, 443 p. L. (College Park)*

Purpose of Study: To present the development and application of personnel instruments and of evaluative procedures useful in a college program wherein industrial arts teachers are prepared.

Source of Data: 61 faculty judges rated 327 industrial arts majors over a 6-year period on 10 personal and professional factors from entry in college to student teaching experience, providing 1,886 ratings. Ratings and scholastic indices were correlated with the criterion of their student teaching success. An accumulative record was developed and utilized for summarizing these ratings and other personal data.

Findings and Conclusions: The rating instrument employed had the required reliability. The relation of personal and professional factors to criterion of student teaching success, of scholastic indices to the criterion, and of personal and professional factors to scholastic indices, were all significant at the 0.001 level. As single predictors at the pre-student teaching level both the ratings and the scholastic indices appeared to have substantial value for selection and evaluation procedures at Oswego. The combined value of the ratings and the indices of scholarship was a stronger predictor than either one alone. The development and use of a cumulative record proved to be useful to both students and faculty.

3842. HUKILL, VIRON NELSON. *The Do-It-Yourself Movement in Pulaski County, Arkansas, and Its Implications for Industrial Arts.* Ed. D. 1958, University of Missouri, 123 p. L. (Columbia)*

Purpose of Study: To ascertain the scope and extent and the motivating factors of the do-it-yourself movement in Pulaski County, Arkansas, in the areas of home maintenance, repair, alteration, and construction, and to point out their implications for industrial arts.

Source of Data: Screening double postal cards were sent to 2,000 persons whose names were obtained by taking each consecutive 26th male name and address from the Pulaski County 1956 numerical listing of passenger car registrations. Data for the study were obtained from 201 information forms received from 256 persons qualifying as "do-it-yourselfers."

Findings and Conclusions: Active participation in do-it-yourself work is most common in the age group 30–49, and a large percent of the participants are from the three upper occupational groups. Most of them have sufficient hand tools with which to perform their jobs and may have at least two pieces of power equipment, one of which is likely to be an electric hand drill. They are motivated primarily by economic and psychological reasons and are saving a considerable amount of money doing jobs themselves. Most jobs are being performed in the areas of painting, papering, and finishing, electrical work, and carpentry, and the greatest difficulties are being encountered in plumbing and concrete, plaster, and masonry jobs. A majority of do-it-yourself jobs are performed by people working alone who have received practically no help in learning how to do them, other than what they have just picked up. They are desirous of instruction in these activities and think it should be offered in the public schools of their community.

3843. HUSS, WILLIAM E. *An Evaluation of Professional Development in Industrial Arts Student Teaching Through Isolation of Abilities in Teaching Activities at State-Wide Cooperating Schools of the Oswego (N.Y.) State Teachers College.* Ed. D. 1951, The Pennsylvania State University, 326 p. L. (University Park)

Purpose of Study: To discover the professional and technical teaching abilities of student teachers through a program of evaluation and appraisal.

Source of Data and Method of Study: The student teaching program conducted by the State University of New York's State Teachers College at Oswego was chosen as having adequate facilities to conduct an experimental search to determine the professional development that takes place during student teaching. A rating scale was devised on which the master teachers were asked to consider the five degrees of achievement in each of the abilities described in the first week and the last week as a means of appraising growth during the period of practice teaching.

Findings and Conclusions: Student teachers showed average growth during practice teaching in the following areas of activity: (a) understanding and using industrial arts objectives, (b) using democratic practices in the shop, (c) developing self-assurance and a feeling of success in learners, (d) questioning and evaluation, and (e) managing a shop and personnel organization. A relatively small growth in the following areas was evident: (a) the ability to promote pupil thinking and planning, (b) the ability and zeal to use teaching aids, and (c) the ability to demonstrate competency in manipulative skills. The major activities which showed greatest improvement during practice teaching were those specifically related to methods in teaching.

3844. IRGANG, FRANK JACOB. *Community Factors in the Determination of the Instructional Areas of an Industrial Arts Program.* Ph. D. 1956, University of Michigan, 174 p. L. (Ann Arbor)*

Purpose of Study: To define the community factors that should be included in the criteria used to determine the instructional areas of an industrial arts program and to ascertain to what degree these factors are being used in the State of Michigan.

Source of Data: An analysis of literature to compile a basic list of community factors, which were then submitted for rating to a jury of specialists in industrial education and to selected industrial arts instructors.

Findings and Conclusions: The industrial arts instructors considered the community factors to be of greater importance in determining the instructional areas of an industrial arts program than did the jury of specialists. The community factors are being considered in an order of importance acceptable to the industrial arts instructors. In actual practice the significance of the community factors is not being considered to the degree desired by the industrial arts instructors.

3845. JACOBSEN, ECKHART A. *A Comparison of Competitive and Cooperative Learning Experiences in Technical Drawing on the College Level.* Ph. D. 1957, University of Connecticut, 222 p. L. (Storrs)

Purpose of Study: To compare the effects of competitive learning experiences with the effects of cooperative learning experiences relative to achievement in technical drawing; and to compare the attitudes of students participating in the experiences with regard to some of the characteristics common to these two learning situations.

Source of Data: The experiment involved the members of the freshman class who were eligible to take technical drawing at the State Teachers College, Fitchburg, Massachusetts, during the September 1955 semester. Two sections were made by pairing individuals and then dividing each pair into two matched sections. Pairing was based upon scores made on intelligence and technical drawing aptitude tests. The significance of the difference between the means in terms of *t* values was used in comparing data.

Findings and Conclusions: Students competitively organized achieved significantly less in problem selection and developed significantly poorer attitudes and interpersonal relations than did those cooperatively organized in a classroom learning situation. Although not significantly different, students cooperatively organized developed similar or better attitudes toward different aspects of understanding, use of resources, self-evaluation, and motivation than did those competitively organized.

No significant differences of achievement were found in either the acquisition of information or in the development of a demonstrable skill in technical drawing between those students competitively and cooperatively organized in a classroom learning situation.

3846. JOHNSON, HARRY LEROY. *Curriculum Development in Vocational-Technical Education: With Special Reference to the Norfolk Division of Virginia State College.* Ed. D. 1956, Wayne State University, 143 p. L. (Detroit, Mich.)

Purpose of Study: To ascertain the need for vocational-technical education programs in the Tidewater area of Virginia and the feasibility of offering such programs at the Norfolk division of Virginia State College.

Source of Data: Personal interviews with personnel directors, managers, and owners of selected industrial firms in the area.

Findings and Conclusions: Many technical areas of need were discovered in the Norfolk-Portsmouth community. The curriculum in electronics and electricity showed the greatest potential in terms of annual replacements. Building construction, automotive, general business, and general supervision technologies followed in that order with relatively high replacement needs in all. The time required ranged from 1 to 3 years, full-time training. There is a need for additional training centers for technicians and experience indicated that the community college had been successful for this purpose.

3847. JOHNSON, MARVIN E. *Practices in the Selection of Apprentices for Training and Their Relation to the Completion Rate.* Ed. D. 1959, *University of Missouri,* 187 p. L. (Columbia)*

Purpose of Study: To ascertain the practices employed in the selection of apprentices in a group of apprenticeship training programs, and to find out the extent to which the selection policies, practices, and devices used in the apprenticeship training programs varied with the apprentice completion rate.

Source of Data: Information forms which were filled out and returned by persons recommended as being most familiar with the practices of selecting apprentices for 143 apprenticeship programs in the manufacturing industry and 46 programs in the construction industry. The apprenticeship programs included in the study represented all areas of the State of Illinois.

Findings and Conclusions: Representatives of management and labor played an important part in the selection of apprentices for training. The sons and relatives of craftsmen and the companies' employees were the major sources of applicants for apprenticeship training. A wide variety of selection practices and devices were used in evaluating the qualifications of applicants for apprenticeship training. Apprentice-selection officials considered the most effective devices used in selecting youth for training to be the interview, application forms, references, testing program, and probationary period. Although the various selection devices and methods are probably better predictive devices than the subjective opinions of selection officials when appraising and evaluating the personal qualifications of applicants, there seemed to be little or no relationship between the percentages of apprentices completing training in the programs and the use of application forms, employment tests, interviews, and personal references. It seemed evident that many other factors were involved in the problem of selecting apprentices and that there was a need for developing closer working relationships among all groups interested in apprenticeship training.

3848. JOHNSTON, JOHN L. *Teacher-Demonstrations Versus Shop Activities in the Teaching of Electricity: An Experimental Comparison.* Ed. D. 1956, University of Missouri, 191 p. L. (Columbia)*

Purpose of Study: To ascertain the relative effectiveness or superiority of teacher demonstrations and shop activities in the teaching of general electricity at the college level.

Source of Data: An experimental comparison of the two instructional methods in a college teaching situation involving 106 college industrial education students of general electricity and continuing over a period of 2 school years. For purposes of comparing educational outcomes, 38 pairs of students were matched on mental ability and initial status in the subject. Data were handled by testing the mean differences for statistical significance.

Findings and Conclusions: Insofar as the acquiring of information was concerned, the teacher demonstrations were found to be superior to shop activities as used in the study. The expense involved in the use of the demonstration method was found to be less than that of the shop-activity method. In terms of effort required on the part of the instructor, the demonstration method was found to be superior to the shop-activity method. No significant difference was found to exist between the two groups as to attitudes expressed toward the subject when taught by the respective methods. As defined and used in the study, and in terms of the stated criteria, teacher demonstrations of electrical principles and their application are superior to, or more effective than, shop activities in the teaching of general electricity to industrial education students at the college level.

3849. **KAGY, FREDERICK DAVID.** *The Status and Problems of the Industrial Arts Teacher in Colorado, 1957.* Ed. D. 1959, University of Wyoming, 146 p. L. (Laramie); also Library, Colorado State College, Greeley

Purpose of Study: To show the status and instructional problems of teachers of industrial arts in their teaching situations in Colorado.

Source of Data: Questionnaires sent to industrial arts teachers of Colorado. The criteria for judging the results of the questionnaires were based on a review of literature and the findings of a jury of experts.

Findings and Conclusions: Industrial arts teachers are becoming better qualified—almost half of them hold master's degrees—are relatively happy in their teaching situations—working hours and class sizes have been greatly reduced in the last 10 years, and salaries have increased—and the number of industrial arts teachers is growing—there has been a large influx from other States. The bulk of industrial arts teaching is confined to junior and senior high.

3850. **KAPLAN, HAROLD.** *A Course of Study for Entrance Production Workers in the Radio Manufacturing Industry.* Ed. D. 1956, New York University, 403 p. L. (New York)

Purpose of Study: To develop a course of study for the training of entrance production workers in the radio manufacturing industry.

Source of Data: Questionnaires, checklists, visits to manufacturing plants, interviews with production personnel at all levels, job analyses of entrance production jobs, and reference to the Dictionary of Occupational Titles. Data were verified through the use of juries of experts in the fields of radio production and radio instruction.

Findings and Conclusions: A complete course of study for entrance production workers was developed. The course consisted of a group of job sheets for training the learners in basic operations, and a group of operation sheets for training the learners in the production-line portions of the course.

3851. **KEENER, CLYDE.** *A Study of the General Educational Contributions of Industrial Arts.* Ed. D. 1959, University of California, 128 p. L. (Los Angeles)

Purpose of Study: To ascertain the nature and extent of the contributions of selected industrial arts classes (junior high school woodshop) to general education.

Source of Data: From observation of the classes conducted by 15 teachers, the behaviors of 1,200 students were recorded. Each class was observed twice. The evaluation form in *Behavioral Goals of General Education* was completed by interviewing each teacher in the study. Observed student behaviors were matched with 99 statements of behavioral outcomes listed in the instrument and the frequencies reported.

Findings and Conclusions: Of the 99 behavioral outcomes on the instrument, 47 were observed in the classes. Based on frequency of observed behavior it seems that the selected courses contribute to general education in the areas of (1) attaining maximum intellectual growth and development, (2) becoming culturally oriented and integrated, (3) maintaining and improving physical and mental health, (4) becoming economically competent in growth toward self-realization and desirable interpersonal relations in small groups. The teachers showed no consistency in their attitudes toward general education, and there seems to be no causal relationship between their attitudes and observed student behavior.

3852. **KIGIN, DENIS JOHN.** *Tort Liability Affecting Shop Teachers With Provisions for Avoiding Accidents and Litigation.* Ed. D. 1959, University of Missouri, 209 p. L. (Columbia)*

Purpose of Study: To ascertain to what extent shop teachers are held liable in court actions resulting from classroom accidents; to point out what legal protection is available to shop teachers, with possible methods of avoiding accidents and litigation; and to make shop teachers aware of the need for a basic understanding of the law as it affects them in their everyday school activities.

Source of Data: Information forms sent to State supervisors of trade and industrial education and to executive secretaries of State teachers associations in the 48 States and the District of Columbia; law books and law reviews; books on school law; professional education journals; newspapers; State statutes; and the National Reporter System. All material was proofread by a practicing attorney at law.

Findings and Conclusions: A school district is not subject to suit unless a statute specifically makes it liable. An individual teacher is liable to suit for his torts, but negligence must be proved. Save harmless legislation and group occupational insurance have proved successful in assuring teachers financial assistance in the event of litigation. Persons in State supervisory positions apparently are not fully aware of the conditions prevalent in their respective States. Negligence has been found to be the most common reason for which a shop teacher can be held liable, and one is liable in a negligence suit only if it can be shown that the injury to another follows without any intervening cause from negligent, careless, or improper actions of the defendant. It was found that the best protection a shop teacher has from liability lies in the use of extreme care in all cases in which it is possible for a pupil injury to occur.

3853. KING, THOMAS GORDEN. *Fundamental Procedures of Research for Industrial Education.* Ed. D. 1959, Wayne State University, 312 p. General L. (Detroit, Mich.)*

Purpose of Study: To prepare a manuscript for consideration in revision of the present syllabus on research in vocational education at Wayne, based on a documental analysis of courses of study on research procedures required of graduate industrial education students and an analysis of selected doctoral dissertations in industrial education.

Source of Data: Analysis of courses of study, study outlines, handbooks, graduate school bulletins, and dissertations. Documentary analysis of course materials from 32 colleges and universities offering graduate majors or degrees in industrial education in the North Central Association area.

Findings and Conclusions: Fifteen units of instruction thought important in preparing graduate industrial education students to conduct research at the master's level were identified. Seven predominant research types were identified from the dissertations showing an expanded use of various types of research in industrial education since Feirer's study in 1939. Seven areas of interest were identified from which problems for the dissertations had been taken. A checklist was devised for a student to use in checking the rough draft of his research before submitting it for his advisor's approval. Findings were incorporated in a manuscript for a revised syllabus on research procedures in industrial education.

3854. KLEINBACH, MERLIN H. *Physical and Biological Science Material Incorporated in Textbooks for General Shop.* Ed. D. 1959, University of Missouri, 151 p. L. (Columbia)*

Purpose of Study: To ascertain which principles of physical and biological science have application to the material taught in general shop, and to ascertain the nature and extent of the emphasis which general shop textbook material places upon the applications of those principles in the subject matter of general shop.

Source of Data: Six studies in science education were used as sources of statements of principles of science. The lists were consolidated into a composite list of 409 principles of physical and biological science. Nineteen textbooks written for students at the general shop level were analyzed for statements making application to these principles.

Findings and Conclusions: Only 147 of the 409 principles of physical and biological science had application to the material in textbooks for general shop. The area of electricity contained approximately 50 percent of all applications and over one-fourth of the applications were found in material devoted to metalworking. In general, those books which devoted larger amounts of textual material to the area of electricity contained more applications. Forty-nine of the 53 principles with 10 or more applications were classified under 3 science topics—magnetism and electricity; matter, energy and simple machines; and fire and heat. These topics and fluids are more closely related to the subject matter of general shop than are principles in other science topics. The electricity area of industrial arts involves more science content than other areas. The areas of metalworking and transportation also include a considerable amount of science material.

3855. KOEHLER, EVERETT E. *A Comparison of Collegiate Achievement Between Selected Technical-Vocational High School and Selected General-Academic High School Graduates in the Industrial Arts Teacher Education Programs in New England.* Ph. D. 1959, University of Connecticut, 107 p. L. (Storrs)*

Purpose of Study: To reveal any significant differences in achievement between selected technical-vocational high school and selected general-academic high school graduates with respect to needed changes for: (1) the recruitment of new industrial arts education students, (2) the adjustment of industrial arts teacher education curriculums.

Source of Data: Statistical comparisons between these two groups were computed in three specific areas of collegiate achievement: (1) technical education, (2) general education, and (3) professional education.

Data were taken from the personal folders of each student relative to achievement in the three areas considered. IQ ratings were used to equate the two groups. In all instances the only comparisons made were those between the achievements of both groups of students. Colleges were referred to as College A, B, C, and D.

Appropriate tests were applied to determine the variance in achievement between these two groups, using the F-test technique. Tests for variance between the two groups were made within each college, and then a similar test was applied to the total general-academic group as compared to the total technical-vocational group.

Findings and Conclusions: It was found that the highest F-values, indicating the greatest variance, were in English, and in one college this value was high enough to be significant at the 1 percent level. The least variance was in the professional area. In the technical area there was no significant difference in achievement; the highest F-value appeared in power mechanics.

This study indicates that neither the general-academic nor the technical-vocational high school is superior in preparing students for success in this field of teacher education and that industrial arts teacher education programs should modify the English programs to include work in remedial English.

3856. KURTZ, HARMON HENRY. *A Study of the Use of Occupational Information in Secondary Schools.* Ed. D. 1959, University of California, 207 p. L. (Los Angeles)

Purpose of Study: To survey literature and to study research on the use of occupational information in secondary schools.

Source of Data: Fifty research studies dealing with the effectiveness of the occupations course, the percentage of schools offering courses in occupations and methods and materials used in disseminating occupational information were analyzed. Six California educators were interviewed regarding ten questions raised by research studies.

Findings and Conclusions: The study indicated that secondary schools should have a well organized program for presenting occupational information and should use a variety of methods and materials. Although such information should be presented at all secondary school grade levels, a special need seemed to exist at the ninth- and twelfth-grade levels.

3857. LAPPIN, ALVIN ROGER. *An Evaluation of Procedures for Introducing New Materials, Tools and Processes in Industrial Arts Teacher Education.* Ed. D. 1958, Wayne State University, 215 p. Detroit, Mich. Microfilms, University of Michigan, Ann Arbor.

Purpose of Study: To investigate the effectiveness of procedures used in industrial arts teacher education to keep curriculums technologically up to date.

Source of Data: A study of procedures used by 73 departmental chairmen for introducing new materials, tools, and processes into their curriculum and the procedures used by 57 selected teachers of plastics for becoming competent to teach new materials, tools, and processes. A jury of 28 departmental chairmen evaluated "principles for good practices" in keeping industrial arts teacher education technologically up to date.

Findings and Conclusions: Instructors should be qualified to establish objectives for including new tools, materials, and processes; identify course content; select units of instruction; devise ways for teaching the units; develop evaluation procedures; identify supplies, tools, and equipment; and organize courses of study. Industrial arts teaching departments have not generally kept abreast of new technological developments. Progressive teachers in service sought sources outside of teaching to develop competency to teach newer materials, tools, and processes.

3858. LINDBECK, JOHN ROBERT. *A Frame for Research in Industrial Arts.* Ph. D. 1958, University of Minnesota, 165 p. L. (Minneapolis)

Purpose of Study: To discover the derivation and nature of the generalizations made for the field of industrial arts and to establish a framework for industrial arts research using this information and keeping within the methods of science.

Source of Data: A review of literature was undertaken to reveal any frequency patterns with respect to claims made for industrial arts. From the frequency pattern a master list of generalizations or claims was derived.

Findings and Conclusions: There is a dearth of factual evidence to support the claims made for industrial arts. Many such claims are based upon years of experience and therefore of immeasurable value, although evidence other than opinion was found to be negligible.

Because of the trend in scientific procedures toward adjudging a hypothesis a theory only after it has undergone a validation process, it follows that there are at present *no* theories of industrial arts, *per se.* The claims made for this field merely constitute, at best, a set of calculated guesses or working hypotheses which are yet to be verified.

An examination of research studies disclosed that the majority were of the survey type, which, though of value in the total research picture, do not lend themselves to the verification of hypotheses as well as experimental research.

3859. LITTRELL, JOSEPH J. *Employment Requirements and Opportunities for Women as Technicians in* *the St. Louis Labor Market Area.* Ed. D. 1958, University of Missouri, 138 p. L. (Columbia)*

Purpose of Study: To ascertain the occupations in which women were working as technicians in the St. Louis labor market area and the requirements and opportunities for employment.

Source of Data: 431 establishments having over 100 employees were contacted in the St. Louis metropolitan area to ascertain whether or not women were employed as technicians. Persons familiar with employment requirements and opportunities for technicians were interviewed in 67 establishments employing women technicians.

Findings and Conclusions: While only a few of the large employers of labor in the St. Louis metropolitan area hire women technicians, it is anticipated that there will be approximately a 14-percent increase in the technical positions during the next 3 years and another 10-percent increase of personnel will be needed to replace present technical employees who are expected to leave their jobs. Women will find the best opportunities for employment in the large establishments as chemist assistants, detailers, medical technicians, engineering assistants and production illustrators. Employers preferred to hire younger women who were technical institute graduates or had some college training in mathematics, chemistry, physics, or drafting. Race, marital status, and previous work experience were not important factors in the employment of women technicians. There was a wide range of starting salaries for women technicians, with a median starting salary of over $275 per month.

3860. LOCKETTE, RUTHERFORD E. *The Effect of Level of Aspiration Upon the Learning of Skills.* Ed. D. 1956, University of Illinois, 88 p. L. (Urbana)*

Purpose of Study: To ascertain the effects of realistic or unrealistic levels of aspiration.

Source of Data: Experimental treatment was designed to induce realistic levels of aspiration in two groups and unrealistic levels of aspiration in two groups. The fifth group served as control. Subjects employed were 11th- and 12th-grade students. It was hypothesized that realistic subjects would (1) be better satisfied, (2) achieve the task more successfully, (3) make more specific judgments relative to improvement needs, and (4) be more confident of their ability to improve. Appropriate statistics were employed to test the data. The level of confidence was set at 0.05.

Findings and Conclusions: Subjects treated realistically were found to set lower goals, experience greater satisfaction, perform more efficiently in terms of performance scores and in the proportion of possible improvement made, and be more specific relative to their improvement needs. There was insufficient evidence to support the hypothesis that realistic subjects are more confident of their ability to improve.

Generally, methods which induce subjects to set realistic levels of aspiration are superior to those which induce subjects to set unrealistic levels of aspiration.

3861. LOGUE, JAY LAWRENCE. *A Follow-Up of Engineering Graduates, University of Missouri, 1946–1955.* Ed. D 1959, University of Missouri, 160 p. L. (Columbia)*

Purpose of Study: To ascertain (1) the various types of positions held by the graduates of the College of Engineering, (2) the extent to which the education they received was meeting their needs, and (3) to make suggestions for improvements. (4) Further, the study sought to obtain the respondents' evaluation of the importance of drafting as a part of the engineering curriculum.

Source of Data: Records of the engineering dean's office and information forms completed by 778 of the 1,598 graduates of the College of Engineering. Percentage tables were used in handling the data.

Findings and Conclusions: It appears that a large percentage of the graduates lack proper guidance in the selection of nonengineering courses. Graduates should have a greater opportunity for participation in actual engineering problems in practical experiments while in college. Insofar as scholastic success is concerned, it makes little difference whether a student completes all the requirements for the bachelor's degree at the University of Missouri or transfers credit from another school. There is a need for additional training in public speaking and in technical English. There is no need for a foreign language requirement in the College of Engineering. There appears to be a definite trend in engineering practice for greater emphasis upon fundamentals of drafting. There is a need for a unified course in drafting which will emphasize the more valuable units of engineering drawing and descriptive geometry.

3862. LUCE, LAWRENCE WINSTON. *History of Industrial Arts Education in the San Diego City Schools.* Ed. D. 1957, University of California, 454 p. L. (Los Angeles)

Purpose of Study: To trace the history of industrial arts education in San Diego.

Source of Data and Method of Study: General historical method was used. Primary information was obtained from 18 volumes of school board records, from school publication of reports, courses of study, newspaper files, and various other public records.

Findings and Conclusions: The history traces the growth of shopwork in San Diego schools through phases of manual training into the present comprehensive program of industrial arts education.

3863. LUX, DONALD GREGARY. *Industrial Cooperative Vocational Teacher Education.* Ph. D. 1955, The Ohio State University, 264 p. L. (Columbus)

Purpose of Study: To find a method of preparing trade and industrial vocational teachers which can provide the State of Illinois with an adequate number of teachers competent both in their trade and in the teaching profession.

Source of Data: A documentary was made to provide the socio-economic setting as it relates to vocational education in general and to trade and industrial education in particular. The scope and characteristics of cooperative education were determined by studying the available literature. Outstanding cooperative programs were studied. A national survey and visits were conducted to determine present cooperative trade and industrial teacher education practices.

Findings and Conclusions: The University of Illinois should institute the proposed program. The secondary schools should provide further preemployment trade and industrial training. Professional leadership should develop programs which combine the basic elements of a teacher education program. State departments of education should re-evaluate their certification requirements for trade and industrial teachers. A comprehensive evaluation should be made periodically to determine the effectiveness of the cooperative program.

3864. McCAIN, JERRY CLAY. *Textbook Suitability for the Industrial Arts Program in Texas.* Ed. D. 1959, North Texas State College, 112 p. L. (Denton)

Purpose of Study: To ascertain the degree of suitability of the State-adopted industrial arts textbooks for use in a sound industrial arts program in Texas.

Source of Data: Available literature, research studies, the American Vocational Association bulletin, State bulletins, textbok publishing companies, and a panel of teachers of industrial arts for the various subject areas for which State-adopted textbooks are provided. The available textbooks were classified according to grade level, and the subject matter for the various subject areas was approved by a jury. Criteria were developed and applied to the content of the State-adopted textbooks for industrial arts. The degree of suitability of textbooks under study was expressed in terms of percent.

Findings and Conclusions: Textbooks for drawing and woodworking were found to be more suitable than the textbooks for the other subject areas. The State-adopted textbooks for the industrial arts program were found to have a low degree of suitability with respect to much of the approved subject matter as determined in this study. The textbook for the area of crafts received a low rating, partly due to the absence of treatment of certain phases of the subject area. In order to conduct a sound industrial arts program, teachers of industrial arts for the various subject areas must rely on supplementary texts and other materials in classroom instruction because of the low levels of suitability of the State-adopted textbooks. There is a need for more comprehensive textbooks in all the subject-matter areas, particularly in crafts, metalworking, auto mechanics, and electricity and electronics.

3865. MAHONEY, JAMES HERBERT. *State Instructional Materials in Industrial Arts: Their Status, Content, Preparation and Use.* Ed. D. 1956, University of Missouri, 155 p L. (Columbia)*

Purpose of Study: To ascertain the status, content, preparation, and use of industrial arts instructional materials prepared under the leadership of State departments of education.

Source of Data: An analysis of State-prepared industrial arts publications, letters and information forms from representatives of the 48 State departments of education, and information forms returned by 357 Missouri industrial arts teachers.

Findings and Conclusions: More States plan to provide handbooks and course outlines in the future than have in the past. State school agencies currently favor course outlines over handbooks, while teachers indicate a need for both. Inadequate supervision at the State level limits the preparation of these materials. There is much uniformity of content among the State's publications. Topics relating to course content should be carefully selected, as they are used consistently. Teachers tend to make greater use of those topics which can be applied directly to the problems of routine classroom instruction. Teachers with 4 or more years of teaching experience and those with master's degrees tend to value and use State-prepared instructional materials to a greater extent than do beginning teachers and those with bachelor's degrees only.

3866. **MANGANELLI, FRED DANIEL.** *Implications of Technological Developments in Industry for Technical Institute Programs in Mechanical Technology.* Ph. D. 1959, University of Connecticut, 299 p. L. (Storrs)*

Purpose of Study: To determine the implications of technological developments in industrial practices for technical institute programs, with special reference to the mechanical technology field.

Source of Data: Information on specific technological developments was obtained from sources suggested by publishing firms and engineering societies.

Questionnaires relative to significant technological developments and special technical information and skills required of mechanical technicians were sent to 50 companies engaged in metal products manufacturing in Connecticut; 70 percent of the companies responded. Additional information was obtained in personal interviews with chief engineers, tool engineers, development engineers, and others.

Questionnaires relative to the mechanical technology curriculum with reference to specific or related courses in areas of significant technological developments were also sent to 50 technical institutes; 82 percent responded.

Findings and Conclusions: The technological developments identified, listed under such categories as (1) manufacturing processes, (2) developments in new uses of materials, and (3) problems in design were not entirely new, but in many cases they were improvements over old methods.

Fifty-eight different subjects were reported as being necessary. Hydraulics, mechanics and mechanisms, chemistry, machining processes, heat, production processes, electronic controls, electronics, electricity, metallurgy, heat treatment, materials, tool design and instrument reading, were mentioned with a noticeable degree of frequency.

The analysis of the significant technological developments with respect to special technical information and special technical skills produced very few items that could be considered new. In most cases the instruction is covered as part of the curriculum; however, there were several areas which could be emphasized or expanded to include new information on prevailing processes.

3867. **MELLMAN, ROBERT A.** *An Analysis of Successful Procedures for the Recruitment of Skilled Tradesmen for the Teaching of Vocational Industrial Education in Pennsylvania.* Ed. D. 1957, The Pennsylvania State University, 158 p. L. (University Park)*

Purpose of Study: To survey present trade and industrial education teacher personnel and predict future needs, and to suggest an effective vocational teacher recruitment program.

Source of Data: A questionnaire and a review of literature on teacher recruitment.

Findings and Conclusions: Teachers recognize the importance of recruitment practices. Certification requirements for teachers of trade and industrial classes are adequate. Teacher recruitment practices should be used in every local trade and industrial program.

3868. **MICHELSON, EINO S.** *An Analysis of the Status of Work Experience Programs in Michigan High Schools.* Ph. D. 1956, University of Michigan. 189 p. L. (Ann Arbor)*

Purpose of Study: To ascertain the status of work experience programs in Michigan high schools and to analyse certain phases of program organization and operation.

Source of Data: 533 twelfth-grade high school districts by means of questionnaires, interviews, and published reports of schools and the Department of Public Instruction.

Findings and Conclusions: The larger school districts offered more different kinds of work experience programs, had a larger number of students per program, and had more programs per district. No significant relationship existed between program frequency and tax wealth. The objectives were related to general and specific educational values. Most of the work experience programs were administered by the high school principal. Guidance functions were performed by the person in charge of the program. Provisions for related instruction were weak in most programs. Terminal placement was effective.

3869. **MILLER, THOMAS W.** *Origin and Development of Machines Used in School Shops.* Ed. D. 1958, University of Missouri, 238 p. L. (Columbia)*

Purpose of Study: To trace the development, from their origins to the present, of the power-operated wood and metalworking machines used in school shops.

Source of Data: An intensive survey of the literature pertinent to the subject: books about machines, inventions, and the industrial revolution; textbooks used in wood and machine shops; journals of scientific and trade associations; catalogs of manufacturers of wood and metalworking machinery; and pictures of machines at various stages of their development.

Findings and Conclusions: Most wood and metalworking machines were invented between 1770 and 1850. The invention of many of these machines is attributable to the work of a rather small group of English mechanics and inventors. A number of the early improvements in wood and metalworking machines were of a general nature, affecting the development of all. Among these general improvements were the substitution of metal for wood in frame construction, improved design, the application of an external source of power, and the development of improved cutting tools. Many wood and metalworking machines were originally constructed to duplicate as nearly as possible the hand process which they replaced. The industrial-type of machine was first introduced for school shop use. Toward the end of the 1910–20 decade a class of machines built with features making them especially adaptable for school use began to emerge.

3870. MINELLI, ERNEST L. *The Role of the Departmental Chairman in Industrial Teacher Education: A Survey of the Requirements of the Job and an Analysis and Evaluation of the Activities of the Chairman.* Ed. D. 1958, Wayne State University, 292 p. L. (Detroit)*

Purpose of Study: To obtain pertinent facts, information on qualifications required, and other data concerning the job of the departmental chairman in industrial teacher education.

Source of Data: A questionnaire-checksheet to obtain information concerning the role of the departmental chairman was sent to 123 chairmen of departments of industrial teacher education who were selected according to pre-established criteria. A study of the requirements of the job and an analysis and evaluation of the activities of the chairman were made to ascertain the role of the chairman.

Findings and Conclusions: Information included: (1) preparation and experience desirable for performing the job, (2) working conditions of the job, (3) activities of the chairmen, (4) activities of the chairmen ranked according to importance, and (5) average weekly hours devoted by the chairmen to the various phases of their jobs, including the total number of hours spent per work week.

3871. MITCHELL, JOHN. *The Identification and Evaluation of Instructional Units in Organization and Management of General Shops for Industrial Arts Teacher Education.* Ed. D. 1954, The Pennsylvania State University, 194 p. L. (University Park)

Purpose of Study: To determine from selected outstanding general industrial arts teachers throughout the United States the present practices and recommendations for instructional units in organization and management of the general shop for teacher education, and to compare the evaluations of the instructional units of all respondents and rank them in the order of their importance for professional courses, units of courses, or professionalized shop courses in the organization and management of the general shop in teacher education.

Source of Data and Method of Study: A questionnaire-checksheet containing a validated list of 122 activities which could form instructional units in the organization and management of the general shop was submitted to outstanding general industrial arts teachers throughout the country. These teachers checked as follows the unit activities listed: (1) whether they performed or made provisions for the activity during the course of their work; (2) to what extent they delegated to students the responsibility of performing the activity; (3) the importance they attached to the activity; and (4) whether they believed the activity should be taught in teacher education programs. The mean importance ratings and activities arranged in rank order are included in the study.

Findings and Conclusions: All but seven activities in the list rated important or above. The activities concerned with physical matters are, for the most part, considered of greater importance for the successful operation of a general shop than those concerned with organizing personnel for instruction. The problems of organization and management, particularly as they apply to the general industrial arts shop, must be given adequate consideration by those who prepare prospective teachers as well as by those who would conduct such a shop efficiently and successfully.

3872. MONEY, HOMER E. *Practices and Opinions of Texas School Administrators Concerning Federally Reimbursed Vocational Education.* Ed. D. 1956, University of Missouri, 199 p. L. (Columbia)*

Purpose of Study: To ascertain practices and opinions of Texas school administrators concerning federally reimbursed programs of vocational agriculture, trade and industrial education, distributive education, and vocational home economics.

Source of Data: Opinionnaires sent to every superintendent and principal in Texas whose school offered one or more federally reimbursed vocational programs.

Findings and Conclusions: In the opinion of the administrators: Length of vocational classes resulted in scheduling difficulties, general education funds were being diverted to vocational education, withholding reimbursement from mixed vocational and nonvocational classes was unsound, vocational needs of youth were not being met, vocational teachers should not receive larger salaries than others, and professional education courses had not aided in administering vocational programs. The administrator did feel that vocational clubs were desirable, that no feeling of separateness between vocational and general education students was noticeable, that there were not too many Federal and State controls, that the communities regarded vocational education highly, that vocational teachers kept abreast of current changes, and that the help given by State supervisory personnel was sufficient. The administrators' opinions of what guidance should be does not correspond to those of authorities in the field.

3873. MORTIMER, WILLIAM EARL. ***Attitudes of Educators and Students in Utah Toward Manual Labor and Manual Workers.*** Ed. D. 1956, University of Missouri, 212 p. L. (Columbia)*

Purpose of Study: To ascertain the attitudes which educators and students in Utah hold toward manual labor and manual workers, to compare the attitudes of various groups of educators and students, and to find out if any relationship exists between the general level of intelligence of students and their attitudes toward manual labor and manual workers.

Source of Data: Information forms in which an attitude scale was incorporated, and which were administered to randomly selected samples of educators and senior high school students in Utah; high school and vocational school records; and literature in the field.

Findings and Conclusions: The mean scores on the attitude scale indicated relatively favorable attitudes toward manual labor and manual workers for both educators and students. Subgroups, ranked from those who had the most favorable attitudes to the least favorable, were as follows: (1) Trade and industrial teachers, (2) industrial arts teachers, (3) vocational agriculture teachers, (4) superintendents, (5) trade and industrial students, (6) vocational agriculture students, (7) principals, (8) counselors, (9) industrial arts students, (10) regular students, (11) regular teachers. When classified by sex, male educators had a more favorable attitude than male students, and female students had a more favorable attitude than male students. Educators with labor union affiliation and students from families with union affiliation had more favorable attitudes than those without union affiliation. There was no important relationship between the general level of intelligence and attitude toward manual labor and manual workers.

3874. MUDGETT, ALBERT GORDON. ***The Effects of Periodic Testing on Learning and Retention in Engineering Drawing.*** Ph. D. 1958, University of Minnesota, 311 p. L. (Minneapolis)

Purpose of Study: To determine the differential effects of three methods of evaluation—daily testing, weekly testing, and monthly testing—on learning and retention of the materials studied in a beginning course of engineering drawing. Differences due to instruction or instructor method interactions were also investigated.

Source of Data and Method of Study: 184 students in eight sections of Drawing 4 at the University of Minnesota were selected and assigned to testing groups by random means. Four instructors, assigned at random, each taught two sections. Data were collected for the students on six measures. High school percentile rank and scores on Engineering Drawing Test-Form A (pretest) were used as control measures. Engineering Drawing Test Form B (fourth week), Form A (ninth week), and the Theory Test (final) were 5-item multiple-choice tests designed of orthographic projection and related graphics. The Performance Test (last class meeting) was constructed to measure the students' ability to understand and interpret problem situations and also their ability to apply the correct solution to the problems.

Findings and Conclusions: At the end of 4 weeks of freehand drawing instruction, no significant effects of the testing program were found. During the ninth week of instruction, differences significant at the 1-percent level were found between combined groups. According to adjusted means, these differences were primarily due to the superiority of the groups tested daily. On the final test, difference between groups were significant at the 5-percent level. In a breakdown analysis the differences were found to be between combined groups, and the adjusted means indicated a superiority for instructor A, and B. On the Performance Test, differences significant at the 1-percent level were found for three comparisons: Instructional outcomes for instructor D surpassed those for instructor C; the daily testing method was found to be superior to the monthly testing method; the combined daily-monthly test groups were superior to the combined weekly-monthly test groups where the monthly components were equal. By inference, the daily test method was also found to be superior to the weekly test method. The findings indicate that a daily testing program has considerable merit, and further investigation is recommended.

3875. NELSON, LLOYD PALM. ***Selected Factors Associated With High School Students' Original Interest and Subsequent Development of Interest in a Favorite Leisure-Time Activity.*** **Ed. D. 1955, University of Illinois, 235 p. L. (Urbana)**

Purpose of Study: To prepare an instrument which may be used to investigate factors associated with the hobbies of youth and to identify specific factors which seem to influence the origin and further development of hobby interests.

Source of Data: 49 students from one high school by means of an interview schedule to test 13 hypotheses relative to their favorite leisure-time activities. Four reliability checks were made of the instrument used.

Findings and Conclusions: The mean age of initial hobby interest was 11.6 years; the median and modal age 12 years. The influence of friends and curricular activities in school seemed to affect first hobby interest and subsequent development slightly more than other factors. Development of skill in the hobby intensified interest also.

3876. NEUBAUER, GERHARDT WILLIAM. ***The Significance of Selected Aspects of Wood Technology for Western Culture.*** **Ph. D. 1956, University of Minnesota, 941 p. L. (Minneapolis)**

Purpose of Study: To indicate how wood has conditioned man's effect upon certain aspects of his contemporary environment such as housing and furniture and to create a more adequate understanding of its industrial potential.

Source of Data: A bibliography was developed on the methodology of historical research and reporting. Historical literature having a social orientation was surveyed. A research bibliography was developed from Dutcher's *A Guide to Historical Literature* and the *Harvard Guide to American History.* Government bulletins and documents, periodicals, pamphlets and brochures, and old manuscripts also were used. Pertinent data were obtained from an appraisal of primary reference materials in the Library of Congress. Western history was divided into a number of periods, and the impact of significant developments in wood technology upon selected aspects of each period was analyzed.

Findings and Conclusions: Initially, technological progress stemmed from Egypt and the Middle East rather than from the classic lands of the West. No significant improvements in wood technology occurred between the time of the ancient Egyptians and the application of machine technology to wood processing. An economy of wood and agricultural economy are intimately related. Historically, wood has functioned as an important social leveler. Wood is related to craftsmanship rather than to industry; it is not a suitable resource upon which to found an age of exact science or upon which to base an economy reflecting machine technology, though a manipulation of its properties makes it an indispensable component of such an era.

Some pertinent conclusions and recommendations: More emphasis should be placed upon significant developments in wood technology in history courses and upon creative wooden art forms in humanities courses as evidence of man's drive for aesthetic expression. More emphasis should be placed upon the contemporary status of wood technology in general education courses and those concerned with the preparation of teachers. Traditional industrial arts woodworking courses should be modernized to incorporate new developments in wood technology. Wood technology should be taught as the applied science into which it has evolved. More emphasis should be placed upon functional design in courses concerned with wood fabrication so that the inherent physical properties of wood may be fully utilized.

3877. NICHOLS, DWIGHT WILSON. ***Resource Units in Industrial Arts Teacher Education.*** **Ph. D. 1955, The Ohio State University, 200 p. L. (Columbus)**

Purpose of Study: To ascertain the intent of educators interested in the reorganization of the secondary school curriculum in terms of the concepts for industrial arts education held by John Dewey, Charles Richards, James Russell, Fredrick Bonser, and their followers. To implement the results for the benefit of junior high school industrial arts students and teachers.

Source of Data: An initial survey was made to validate the tentative problem. A bill of particulars and a working bibliography were established. After a comprehensive search and interpretation of the literature, a tentative hypothesis for the study was established. A number of guiding principles and criteria were established to develop a resource unit, and then the resource unit was developed.

Findings and Conclusions: The profession needs to raise its sights concerning subject-matter penetration and method and the development and use of resource units. A program of curriculum research needs to be organized, as the technology is far ahead of the practices. Industry should participate more widely. Administrators should foster curriculum development.

3878. PEDERSEN, GEORGE LESLIE. ***Employee Training in the Metalworking Industries of the Illinois-Iowa Quad-City Area.*** **Ed. D. 1957, Bradley University. 164 p. L. (Peoria, Ill.)**

Purpose of Study: To ascertain the extent and details of apprenticeship, cooperative, supervisory, technical, and tuition-aid programs in 20 of the largest Quad-City metalworking industries. These results are compared with a survey of similar types of training in three of the largest automotive companies in Detroit.

Source of Data: The personal interview-questionnaire method during visits to all plants and companies included in the study.

Findings and Conclusions: Fifteen plants have apprentices in training; the five other plants have conducted programs, but at the time had no apprentices in training. College cooperative programs are sponsored in seven plants in the Quad-Cities and by all of the Detroit companies. Supervisory training was found to be slighted by many of the smaller industries in the Quad-Cities. All larger industries in the Quad-Cities and all companies in the Detroit area have well developed supervisory training programs. Technical training, as a distinct type, was found to exist in only one Quad-City industry. Tuition-aid programs are gaining popularity among industries in the Quad-Cities.

3879. PENDERED, NORMAN C. ***An Evaluative and Comparative Study of Industrial Arts Programs in Selected Junior High Schools of Pennsylvania at Various Levels of Financial Expenditure.*** **Ed. D. 1951, The Pennsylvania State University, 167 p. L. (University Park)**

Purpose of Study: To evaluate and to compare programs of industrial arts at several levels of financial expenditure in certain selected junior high schools of Pennsylvania.

Source of Data and Method of Study: A rating scale was developed and submitted twice to national committees for their validation. The scale was then used by 44 judges to rate 18 industrial arts programs and later reused to evaluate the same programs and a correlation coefficient of 0.967 was found. The junior high school industrial arts programs were selected for study by the use of a questionnaire and an examination of records in the Department of Public Instruction. The application of the rating device was made by a personal visit to each of the selected programs.

Findings and Conclusions: While in some instances it appears that there is a definite positive correlation between the instructional period cost and the quality of the industrial arts program, certain other factors such as what is taught, how it is taught, and who does the teaching, clearly are more closely related and contribute more heavily to the quality of an industrial arts program as measured by the descriptive rating scale.

3880. PETERS, DONALD F. ***Supervision of Industrial Education: Scope of Present Practice, Teacher Reaction to the Practice, and the Apparent Effectiveness of the Practice.*** **Ed. D. 1959, University of Maryland, 190 p. L. (College Park)***

Purpose of Study: To determine the nature and scope of the practice of supervision in industrial education, as described by and reacted to by experienced teachers, and to evaluate the data submitted, using an instrument developed for this purpose.

Source of Data: An instrument developed for gathering data from industrial arts and vocational industrial education teachers. An evaluative criteria was developed and applied to the data received.

Findings and Conclusions: Industrial education teachers who participated in this study apparently do not associate with supervision the clarification of aims, purposes, and principles of education. There is little evidence of any awareness of the educational benefits inherent in deliberations on this level. Teachers request assistance in teaching methods and techniques apparently because techniques resolve immediate problems; they evaluate the effectiveness of the supervisor in terms of the regard supervisors show for the individual student or teacher.

Teachers on their own volition make a high percentage of their requests in the curriculum area. Teachers do not report the use of a variety of organized inservice activities used by supervisors. The dominance of favorable reactions toward supervisors and the initiative exercised by teachers in making contacts with their supervisors are complimentary of teacher-supervisor relationships. The questionable element is the extent to which supervisors and teachers dealt candidly with significant educational problems.

3881. PORTER, CHARLES BADDELEY. *An Experimental Investigation of Selected Variables Related to Morse Code Learning.* Ed. D. 1957, University of Illinois, 85 p. L. (Urbana)*

Purpose of Study: To develop a logical approach to the problem of increasing the effectiveness of teaching Morse Code reception. The psychological orientation adopted was based on a conception of Morse Code learning as being the acquisition of special psychophysical habits.

Source of Data: Data were obtained by measuring the relative effectiveness of two methods of teaching Morse Code. The two groups of nine students used in the experiment were matched on the basis of a pretest.

Findings and Conclusions: The evidence, though supported only in part by statistical tests, suggests that the experimental method used in the study may demonstrate some superiority over the conventional "paired-associates" method for training individuals to receive clear Morse Code text.

3882. POWELL, PAUL ELDON. *Administration of Departments of Industrial Teacher Education: Budget and Accounting Systems.* Ed. D. 1955, Wayne State University, 308 p. L. (Detroit, Mich.)*

Purpose of Study: To survey budget and accounting systems used by 202 departments of industrial teacher education, to determine criteria for good budget and accounting practice, and to recommend budget and accounting forms and methods suitable for such departments.

Source of Data: A survey was conducted by sending questionnaires to departmental chairmen on what they considered to be good budget and accounting practices. A checklist was also sent to those who evidenced a desire to participate, to determine criteria that would serve as a device for judging the effectiveness of present systems and formulating new ones.

Findings and Conclusions: The survey of budget practices of departments of industrial teacher education showed that each department maintained a budget system established by the administration of the institution and that the budget system closely followed the requirements of the State accounting agency. The study proved that departmental chairmen had given very little thought to budget and accounting problems. Budget preparation was done by chairmen in an authoritarian manner with little consideration for having faculty and students involved in such activities.

Departmental budgets were prepared with little thought for the total development of the college or university. The major problems of the departmental chairman in budget preparation were: estimating enrollment, lack of funds, and the attitude of the administrators of the institution toward departmental budgets. Items that chairmen believed should be considered in budget formulation were identified.

Accounting systems in use were developed by departmental chairmen according to their experience and training. Institutional policies and regulations concerning departmental accounting were almost nonexistent.

Seventeen criteria were determined and reported to assist in departmental budget preparation and accounting.

3883. PRUSKI, JOHN. *Vocational Counseling Program for Secondary, Vocational and Other Schools.* Ph. D. 1958, The Ohio State University, 188 p. L. (Columbus)

Purpose of Study: To analyze and evaluate the vocational counseling case of 300 veterans of the Korean campaign who received vocational counseling from the U.S. Veterans Administration and to project and propose a similar program of vocational counseling for adoption by the public secondary schools.

Source of Data: Files of the U.S. Veterans Administration Counseling Unit in Columbus, Ohio. This data was then tallied.

Findings and Conclusions: The individual Survey Data Form may be used in the secondary and other schools. Information not on this survey could be obtained in the school. Test measures for secondary and other schools do not appear to be radically different from those at V.A. counseling.

3884. RANDEL, STEPHEN VINCENT. *A Comparison of Drafting Practices in Industry with Drafting as Taught in Engineering Schools.* Ed. D. 1957, University of Missouri, 215 p. L. (Columbia)*

Purpose of Study: To compare the drafting as taught in engineering colleges with the drafting practices followed in selected machinery manufacturing industries.

Source of Data: Information forms that were prepared and sent to drafting instructors in engineering schools and to chief draftsmen in machinery manufacturing industries throughout the Nation.

Findings and Conclusions: There are various discrepancies in the drafting practices followed by machinery manufacturing industries and drafting as taught in engineering schools. Considerably more lettering devices and machines were used in industry than in schools for improving lettering and drawing techniques. More pictorial drawings were made by respondents from schools than by those from industry. Simplified drafting procedures were not practiced to any great extent by either group. Differences in dimensioning practices in schools and industry appear to be only moderate.

More diagrams and charts were made in industry than in schools. Respondents from industry advocated more experience in shop processes and industrial procedures, better instruction in freehand lettering and drawing techniques, and more training in simplified drafting procedure for drafting students. Respondents from engineering schools advocated more fundamentals of drawing theory and projection, and less time and effort in developing drawing skills and techniques. The largest percentage of respondents from industry had received their most advanced training in drafting from an engineering school.

3885. RAY, WILLIS EUGENE. *An Experimental Comparison of Direct and Detailed and Directed Discovery Methods of Teaching Micrometer Principles and Skills.* Ed. D. 1957, University of Illinois, 181 p. L. (Urbana)

Purpose of Study: To ascertain the relative effectiveness of directed discovery instruction in situations providing numerous problem-solving opportunities, upon initial learning, retention, and transfer of micrometer principles and skills as compared with direct and detailed instruction in these situations, with three levels of intelligence.

Source of Data and Method of Study: Treatments by levels of experimental design were employed. Two experimental teaching methods and one control constituted the treatments, and subjects of three levels of mental ability—117 ninth-grade boys from three junior high schools—served as subjects. The effectiveness of instruction was determined by criterion tests administered immediately following treatment, one week after treatment, and six weeks after treatment. The analysis of variance techniques, correlational techniques, and others were used in relation to their adequacy to the data.

Findings and Conclusions: (1) The direct and detailed and the directed discovery methods of teaching are equally effective with regard to initial learning of micrometer principles and skills.

(2) The direct and detailed and directed discovery methods of teaching are equally effective with reference to retention of material initially learned as measured one week after instruction.

(3) The directed discovery approach to teaching is superior to direct and detailed instruction with respect to retention of material initially learned, as determined six weeks after instruction.

(4) The directed discovery method of teaching is more effective than the direct and detailed approach in enabling students to make wide applications of material learned to new and related situations, both at one and six weeks after instruction.

(5) There is no interaction of teaching method and intellectual level.

3886. RICE, CHARLES MASON MAC DOUGALL. *Methods and Materials for Teaching Photography in the Secondary Schools.* Ed. D. 1958, Oregon State College, 164 p. L. (Corvallis)

Purpose of Study: To obtain pertinent data on the development of instructional practices in photography in the American secondary schools to serve as a guide for instruction and aid in curriculum development.

Source of Data: Manufacturers' agents, pertinent literature, personal experience, and a survey of high school and college photography teachers.

Findings and Conclusions: The science and industrial arts departments in secondary schools were those best prepared to offer photography as a part of general education. Handicaps to teaching were: inadequate teaching space, dearth of equipment and good textbooks, insufficient practice materials. Recommendations are given for: planning courses of study, darkroom planning, facilities and equipment, teaching methods and materials, policies and procedures, and for improvement of instruction.

3887. SARGENT, WILLIAM T. *Student Teaching in Off-Campus Programs in Industrial Arts: A Survey Directed Toward Identifying Qualifications and Responsibilities of Industrial Arts Supervisors and Cooperating Teachers and Toward Evaluating Industrial Arts Off-Campus Student Teaching Activities.* Ed. D. 1957, Wayne State University, 379 p. L. (Detroit, Mich.)

Purpose of Study: To ascertain commendable aspects of off-campus student teaching programs.

Source of Data: 67 supervisors and 125 cooperating teachers in industrial arts off-campus programs in the United States.

Findings and Conclusions: Characteristics and responsibilities of industrial arts supervisors are given, also recommendations for cooperating teachers, for the induction and training of student teachers, and for improving off-campus teaching programs.

3888. SCHAEFER, CARL JOHN. *A Study to Determine a Master Plan for Post-Secondary Vocational-Technical Education for the State of Ohio.* Ph. D. 1959, The Ohio State University, 242 p. Education L. (Columbus)*

Purpose of Study: To develop criteria and a basis for the establishment and presentation of a master plan of vocational-technical education for the State of Ohio.

Source of Data and Method of Study: Data were extracted from references and other research to determine States with a complexion similar to Ohio. Opinions were obtained from a questionnaire sent to 30 practitioners and 30 State leaders of vocational-technical education in six different States; a return of 73.3 percent was received from the questionnaire.

Findings and Conclusions: The master plan developed included plans for authorization to establish and maintain vocational-technical institutes; it provides for State financial aid as a legal basis for the establishment of post-secondary vocational-technical education.

A plan of organization and administration divides the State into 20 well-established economic areas. The establishment of two post-secondary vocational-technical institutes per economic area is cited as a realistic objective.

Plans for level of program and curriculums delineate the thinking of the experts as to actual offerings.

A plan for facilities and financing attempts to provide an adequate and realistic means of meeting capital outlay and operating costs.

A plan of supervision and instructional staff outlines the personnel designated to execute the policies set forth by the Board of Trustees and the required certification of teachers.

3889. SCHOEPPLER, JACOB. *A Case Study of Foremen's Activities and Problems.* Ed. D. 1958, Wayne State University, 130 p. L. (Detroit, Mich.)*

Purpose of Study: To gain insight into the activities of production foremen and the problems related to these activities; and to ascertain significant differences in the way the foremen and their superiors perceived these problems.

Source of Data: Observation of foremen going about their work and intensive interviews of foremen and their superiors.

Findings and conclusions: The study presents a comprehensive list of the activities performed by both production foremen and general foremen, a comprehensive list of the problems related to these activities, and an analysis of the differences in importance attached to these problems by the foremen and their superiors.

3890. SHERMAN, DOUGLAS ROLAND. *The Emerging Role of Vocational-Terminal Education in the Public Community.* Ed. D. 1956, Wayne State University. 298 p. L. (Detroit, Mich.)

Purpose of Study: To ascertain the status and future developments of vocational-terminal education in public community colleges of Michigan.

Source of Data: Literature on the community college, catalogs of Michigan community colleges, visits to each college, a booklet explaining the status of community colleges, and a checklist sent to 91 leaders in education to ascertain their opinions of the future developments.

Findings and Conclusions: A strong tendency existed to force all training programs into a 2-year schedule. The vocational-terminal offerings were not as broad as desired, the majority of all curriculums being in the area of business education. Cooperative work-study programs needed emphasis. The objectives of many curriculums were vague. The enrollment of vocational-terminal education varied widely between colleges. The efficiency of followup and placement procedures was questionable. The instructors in the vocational-terminal were well qualified. Most of the community colleges had inadequate physical facilities and administrative personnel.

3891. SHOEMAKER, BYRL RAYMOND. *Adequacy of Related Technical Instruction in Vocational Trade and Industrial Education in Teaching Principles of Mathematics and Physical Science.* Ph. D. 1957, The Ohio State University, 154 p. L. (Columbus)*

Purpose of Study: To ascertain whether the plan used in Ohio to teach related technical information in trade and industrial education programs is effective in teaching principles of mathematics and physical science needed by the graduates.

Source of Data: A jury of teachers and evaluations of the program by graduates and supervisors of the graduates.

Findings and Conclusions: Teachers, graduates, and supervisors agreed on the mathematics and physical science need for the machine trade. Graduates indicated improvement in instruction was needed. The plan of instruction used was good but needed review and improvement.

3892. SMITH, JAMES ASBURY. *Implications of Television for Industrial Arts.* Ed. D. 1957, Wayne State University, 335 p. L. (Detroit)*

Purpose of Study: To identify significant practices for a brochure of production practices and techniques for telecasting industrial arts activities, to report the scope of participation in telecasting industrial arts activities indicated by respondents in the study, and to review the educational television movement as revealed by pertinent literature.

Source of Data and Method of Study: An appraisal of the literature on educational television and persons who had participated in the production of television programs related to industrial arts. An inventory of 131 statements designed to reflect a favorable viewpoint with respect to individual production practices in telecasting industrial arts activities was submitted in a nationwide poll to 480 different persons who had been active in this field.

Selected practices were identified and resubmitted to participants, who were asked to describe effective techniques they had employed. The practices and techniques developed in this aspect of the study were submitted to 77 program directors of whom 51 responded with letters and editorial and critical suggestions.

Findings and Conclusions: Action of the Federal Communications Commission in 1952 in allocating 242 channels for educational purposes provided the first opportunity for portraying industrial arts activities for purposes of instruction and public understanding, since the inception of industrial arts as a phase of general education.

Television is an effective medium for presenting instruction and can be depended upon to maintain interest, create understanding, promote skills, insure learning and retention, and be generally acceptable to viewers.

A positive interest was manifest in the response of industrial arts teachers, supervisors, and others in related professions indicating their enthusiasm for the medium and their optimism for its future application in televising industrial arts instruction.

3893. SONDERMAN, ROBERT BOULWARE. *Origin, Development and Outcomes of Driver Education.* Ed. D. 1956, University of Missouri. 135 p. L. (Columbia)*

Purpose of Study: To trace the origin and development of driver education in the public secondary schools of Missouri and to ascertain the outcomes of this program.

Source of Data: A study was made of all available material concerning the origin of driver education in Missouri, and an information form was prepared to collect data relative to the development and status of the program. Individual driving records and license test scores were examined to ascertain the outcomes of this program in Missouri.

Findings and Conclusions: The American Automobile Association was primarily responsible for the initiation of driver education in the State of Missouri, beginning in October 1940. School administrators list difficulty of class scheduling and cost as the two most pressing problems in administering a program of driver education. Driver education is a growing program, but the course content seems to be lacking in consumer information applying to automobiles, their services and supplies. Almost 100 percent of the schools grant credit toward graduation for driver education, but only 5 percent require the course for graduation. The findings of the study seem to indicate that students who have had the course in driver education do not appear to have any better driving record than those without the training. This study contradicts the findings of other studies, some of which concluded that driver education does reduce accidents by as much as 50 percent.

3894. SPENCE, WILLIAM P. *Job Planning in Shop Teaching: An Experimental Comparison of Two Approaches.* Ed. D. 1957, University of Missouri, 218 p. L. (Columbia)*

Purpose of Study: To compare two approaches to starting and teaching beginning shop classes in which the element of project planning was the experimental factor.

Source of Data: A comparison of four classes of seventh-grade general shop that were divided into two equated groups. One group participated in teacher-guided planning sessions; the other followed ready-made plans.

Findings and Conclusions: The two groups were about equally effective in skill development, in ability to analyze and plan procedures, in economy of use of materials, in number of errors in project construction, in teaching informational content, and in quality of work. The pupil-planned group had a significantly more favorable attitude toward the shop class and were significantly superior in ability to read working drawings. The teacher-planned approach is significantly superior in quantity of work performed. In the teacher's opinion the pupil-planned approach, in the long run, requires less teacher effort.

3895. **STEEB, RALPH VICTOR.** *The Supervision of Industrial Arts in Pennsylvania.* Ed. D. 1959, University of Pittsburgh, 244 p. L. (Pittsburgh, Pa.)*

Purpose of Study: To determine the status of supervision of industrial arts in the public schools of Pennsylvania and to ascertain and compare the opinions of secondary school principals and industrial arts personnel with respect to certain supervisory practices and types of supervisory organization.

Source of Data: A questionnaire sent to industrial arts teachers selected at random, principals of each of the teachers selected, and all vocational directors and industrial arts supervisors in the State of Pennsylvania.

Findings and Conclusions: Forty-six percent of the teachers report that local school administrators or curriculum coordinators are currently supervising industrial arts. The teachers judge the supervision of administrators and curriculum coordinators to have little value. The teachers consider the supervision of highest value to be that performed by special industrial arts supervisors, but the number of local programs supervised by these persons is small. Supervisory assistance by a county superintendent is limited to a few schools and is not rated highly. Fifty-four percent of the teachers report supervision by a State area coordinator of trade and industrial education, and only one-third of these teachers judge this supervision to have value.

The findings also report the extent of use and value of the following supervisory practices: classroom visits, intervisitation, teachers' meetings, individual conferences, demonstration teaching, bulletins and notices, professional study and activities, tests and measurements, lesson plans, shop planning and improvement, equipment and supply management, and audiovisual aids.

3896. **STEGEMAN, ARTHUR LYLE.** *Training Needs of Technicians in Selected Lumber and Wood Products Industries of Humboldt County, California.* Ed. D. 1957, University of Missouri, 139 p. L. (Columbia)*

Purpose of Study: To ascertain the training needs of technicians in selected lumber and wood products industries of Humboldt County, California.

Source of Data: Personal interviews with representatives of the 59 lumber and wood products industries which employed 25 or more men during normal production.

Findings and Conclusions: It was anticipated that by 1960 there would be 223 technicians employed. Only limited agreement was reached concerning the pre-employment training needed by the 20 types of technicians included. Mathematics, mechanics, physics, electricity, machine shop, electronics, drafting, and use of the slide rule were indicated as needed most often, in that order. Spelling, figuring, lack of speed and ingenuity, and inability to make practical applications were the greatest deficiencies reported. Most firms indicated a need for and offered training in safety facts and figures in their inservice training programs. Training in specialized skill in the use of tools and machines and company policies, rules, and regulations was offered about one-half as often as the need was indicated. Applied courses in mathematics, drawing, and electricity were quite frequently considered necessary but were seldom offered. Social skills and cooperation were not considered the responsibility of inservice training programs.

3897. **STEPHENSON, LESLIE EARLE.** *Superior Practices in the Administration of Industrial Arts Teacher Education.* Ph. D. 1958, The Ohio State University, 335 p. L. (Columbus)

Purpose of Study: To ascertain any central tendency toward a consistent type of viewpoint among administrators in the field of industrial arts education. To develop a valid list of practices to serve as an administrative guide in the development of programs of industrial arts teacher education. To study those administrative practices considered to be superior, in order that they might be of value in strengthening the administrative efforts of industrial arts teacher education departments in the United States.

Source of Data: Critical statements pertaining to internal administration found in the literature of higher education were examined, and a list of administrative practices was developed. This list was revised and sent to leaders in the field of education for validation.

Findings and Conclusions: Seventeen recommendations are listed that pertain mainly to colleges and universities in California.

3898. **STRICKLAND, THOMAS WHITNEY.** *Implications of Selected Behavioral Science Data for Industrial Arts Education.* Ed. D. 1959, University of Maryland, 258 p. L. (College Park)*

Purpose of Study: To present principles derived from behavioral science data in forms applicable to the major elements of industrial arts instruction and to evaluate professional literature intended for preservice and inservice teachers using principles derived from the behavioral sciences.

Source of Data: A review of basic professional literature was conducted and categorized. The behavioral science data was synthesized in terms of principles from which generalizations were derived and applied to two widely used professional texts and to two State-level curriculum guides in industrial arts.

Findings and Conclusions: The professional literature acknowledges the importance of maturational factors in learning, but curriculum and instruction guides suggest uniformity in learning experiences. An adult level of orientation and structuring of learning goals and objectives prevails.

Activities such as problem solving, the relationships of ideas to techniques, and the complexities involved in learning how to plan received little attention. The professional literature examined seemed to miss the principles associated with evaluation.

In substance, the professional literature examined presents an empirical approach to instruction. Behavioral science data are present primarily by inference.

3899. STRONG, MERLE EDWARD. *An Investigation of Trade and Industrial Education Curriculum Materials Development and Curriculum Laboratories in the United States.* Ph. D. 1958, The Ohio State University, 228 p. L. (Columbus)*

Purpose of Study: To investigate the need for a national plan of cooperation and coordination for trade and industrial education curriculum development and to secure information on the organization and operation of presently established curriculum laboratories.

Source of Data and Method of Study: Questionnaires to trade and industrial education State supervisors and curriculum materials specialists in the various States. Additional information was gathered through personal interviews and correspondence with leaders in trade and industrial education.

Findings and Conclusions: The development of sound curriculum materials for trade and industrial education continues to be an area of great need. Only nine States have a person with a major responsibility in this area; these States produce most of the materials. It appears that a greater number of instructional materials could be secured for the same expenditure and funds if duplication among the various States could be reduced and if a national plan for cooperation and coordination existed.

3900. STRUCK, JOHN W. *A Survey of Industrial Education Needs of Baghdad, Iraq, and Its Service Area.* Ed. D. 1956, The Pennsylvania State University, 244 p. L. (University Park)*

Purpose of Study: To determine the size and scope of a new vocational trade school to be built by the Iraqi government in the capital city of Baghdad, Iraq.

Source of Data: A detailed personal-enumeration survey of every single industrial establishment involved in the manufacture or repair of goods or products in Baghdad and its suburbs.

Findings and Conclusions: In the area covered by this study there were 4,573 different firms employing 33,367 industrial workers. There are large numbers of small firms, with only 41 firms employing over 100 persons. The area is growing industrially very fast, and the demand and need for skilled and semi-skilled workers is great. The present Baghdad school is quite ineffectual in meeting the needs. The government should expand its present trade training facilities both quantitatively and qualitatively in many areas. There is a pressing need for competently trained vocational teachers, administrators, and supervisors. It would be practically impossible for a new school to exceed the needs for competent skilled workers for many years to come. Recommendations resulting from this study include specific suggestions for meeting this large demand for skilled workers and recommendations for setting up the new school.

3901. TATE, HAROLD S. *Analysis and Evaluation of the Job of the State Supervisor of Trade and Industrial Education.* Ed. D. 1951, The Pennsylvania State University, 324 p. L. (University Park)

Purpose of Study: To analyze and evaluate the job of the State supervisor of trade and industrial education in 51 States, territories, and districts.

Source of Data and Method of Study: The procedures used were a study of literature for writings from historical, philosophical, or operational viewpoints; an examination of research in industrial education or related fields; an examination of State plans and digests of narrative reports; interviews with State supervisors, State directors, teacher trainers, city directors and other leaders in the field; checksheet returns from State directors, State supervisors, teacher trainers, city directors, and a jury. Evaluative criteria are based on jury replies.

Findings and Conclusions: The author recommends that State supervisors compare their responses with those of their coworkers, prepare a master list of responsibilities for those to whom it might be of value, and examine other responses to see what help is expected from them; that State directors inform State supervisors as to what is expected; that there be more conferences between State supervisors and State directors, teacher trainers, and city directors; that the composite list of duties be used by teacher trainers in their courses; that State supervisors reconsider their responsibility toward industrial arts supervision; that the master's degree be required nonretroactively for State supervisors; that more local and State initiative be used in the preparation of State plans.

3902. THIEL, DONALD WILLIAM. *Industrial Arts in Occupational Therapy; A Study and Projection of Its Relationship to the Activities of Prescribed Treatment in Physical and Mental Disabilities.* Ph. D. 1959, The Ohio State University, 250 p. L. (Columbus)*

Purpose of Study: To ascertain the contributions that industrial arts education can bring to the occupational therapy profession. To provide a professional instrument which might induce better public relations within the two professions concerned, and to establish a basis of understanding by revealing essential, and common facts regarding the mutual concerns of occupational therapy and industrial arts education.

Source of Data: The study evolved from: (1) A review of current and past literature of occupational therapy and industrial arts education, (2) a curriculum survey of 27 schools in the United States approved to offer occupational therapy, (3) a questionnaire survey of 324 registered occupational therapists practicing in the field.

Findings and Conclusions: Registered occupational therapists from all parts of the Nation concluded that industrial arts education activities are essential to their program, and that industrial arts education personnel should be teaching these activities to students of occupational therapy.

The activities deemed essential and representative of those utilized in occupational therapy programs were: (1) Ceramics, (2) drawing and design, (3) fundamentals of electricity, (4) graphic arts, (5) industrial conceptions, (6) jewelry and lapidary, (7) leatherwork, (8) metalwork, (9) plastics, (10) upholstery and furniture refinishing, and (11) woodworking.

All the therapists responding had received experience as undergraduates in 4 or more of the 11 activity areas mentioned.

3903. THOMAS, ALVIN IGNACE. *Industrial Education in the Land-Grant Colleges.* Ph. D. 1957, The Ohio State University, 303 p. L. (Columbus)

Purpose of Study: To trace the origin and development of the land-grant college movement and indicate the place of industrial education in this movement. To identify the spirit and intent of the Land-Grant College Acts of 1862 and 1890. To identify the contemporary patterns of industrial education in the land-grant colleges and universities and establish a basis for projecting industrial education in these colleges and universities in the years ahead. To illustrate a projection of an industrial education program in a land-grant college using the suggested criteria.

Source of Data and Methods of Study: Historical methods were used in tracing the land-grant college movement. A survey determined contemporary patterns of industrial education in the land-grant colleges and universities. Philosophical methods were used in constructing the criteria for projecting industrial education in the land-grant colleges and universities. These were validated by leaders in the field. A survey was made of a land-grant college, and the criteria derived were used for recommendations.

Findings and Conclusions: Land-grant institutions were founded to include practical education in the mechanical arts. Lack of industrialization in the Nation and leadership in the profession contributed to the failure of industrial education to develop a major part of the land-grant colleges. Contemporary technology has created an abundance of jobs requiring post-high school education not requiring a degree, and industrial education on the higher levels should provide this right now. Professional leadership and additional research is needed to overcome the obstacle of positions taken by land-grant colleges.

3904. THOMAS, JOSEPH KOVAC. *Use and Effectiveness of Public Relations Practices in the Interpretation of Industrial Arts in Selected Secondary Schools of California.* Ed. D. 1957, University of Missouri, 183 p. L. (Columbia)*

Purpose of Study: To ascertain the use and effectiveness of public relation practices by teachers who actively interpreted their industrial arts program as compared with teachers who did less interpretation in selected secondary schools of California.

Source of Data: Two information forms, one returned by 132 industrial art teachers and the other returned by 440 parents of boys, from a random sample.

Findings and Conclusions: Teachers who actively interpreted industrial arts are more likely to be active in school and professional activities, are more likely to receive extra pay and free periods for departmental duties, reported using practically all of the public relations practices, and gave higher values of effectiveness for nearly all practices. Teachers believe that industrial art teachers should be expected to publicize their programs, that their public relations program should be expanded, and that teachers have a tendency to overrate the effectiveness of their program. Parents appeared to be satisfied with the industrial arts curriculum, were more aware of the vocational aspects of industrial arts, and indicated electricity as a course they would advise their children to take.

3905. TOWERS, EDWARD ROY. *An Evaluation and Projection of the Undergraduate Program of The Ohio State University.* Ph. D. 1956, The Ohio State University, 278 p. L. (Columbus)*

Purpose of Study: To evaluate and project the undergraduate industrial arts teacher education program at The Ohio State University.

Source of Data: A documentary survey to trace the evolution of the practical arts and the founding of The Ohio State University; a survey to find the characteristics and purposes of industrial arts on the elementary and secondary levels of Ohio schools; an evaluative criterion to evaluate the undergraduate program; interviews, correspondence, and available literature.

Findings and Conclusions: The purposes of the program should be re-examined and brought up to date. A new physical facility should be planned immediately. A technical curriculum to reflect technology should be implemented during the first 2 years of the undergraduate program. The specialized professional education program should be revised and broadened to provide a wide variety of experiences of different levels. A continuous program of evaluation should be developed. Syllabuses and course outlines should be developed for the courses in the transitional curriculum.

3906. TURNER, ERWIN. *A Survey of Employer Opinion of the Adequacy of Trade and Industrial Training in Selected Schools of South Dakota.* Ed. D. 1958, Colorado State College, 222 p. L. (Greeley)*

Purpose of Study: To ascertain the satisfaction or dissatisfaction of employers with the graduates of federally reimbursed trade and industrial education courses of selected schools of South Dakota by obtaining their opinions concerning specific items connected with the performance of employees.

Source of Data: Personal interviews from 11 schools out of 16 offering federally reimbursed courses and from interviews of the first employer of each graduate of the program.

Findings and Conclusions: Employers rated the success of the graduates of trade courses as better than that of beginning workers normally employed as to skill, related information, general education, and personality. The more successful the graduate, the more training he took after completing his trade course.

More of the graduates whose success was rated equal to that of the top 5 percent of beginning workers normally employed took post-employment training than did those rated equal to the lowest 25 percent. Skill and personality are about equally important, with a margin in favor of skill. The relative importance of skill and personality varies with the individual trades.

3907. TURNER, ROBERT E. *Duties and Requirements of Personnel Who Work with Electronic Devices in Manufacturing Industries.* Ed. D. 1957, University of Missouri, 173 p. L. (Columbia)*

Purpose of Study: To obtain information relative to the duties, opportunities, and requirements of persons who work with electronic devices in manufacturing industries in the St. Louis metropolitan area.

Source of Data: The Missouri Division of Employment Security; Chamber of Commerce of Metropolitan St. Louis; inquiries sent to manufacturing firms; telephone conversations with various plant personnel; interviews with persons familiar with the duties, opportunities, and requirements of personnel who work with electronic devices; and literature pertinent to the study. The study included 396 manufacturing firms, each of which employed 100 or more people.

Findings and Conclusions: The principal duties associated with electronics consist of: diagnosing trouble, adjusting, servicing, assembling, making repairs, installing, and maintaining equipment. If anticipated demands are met, these workers will increase by approximately 50 percent within the next 3 years. There appears to be a reasonable number of opportunities for individuals, both white and nonwhite, well trained in this type of work. The opportunities for women are limited. Greatest opportunities are found in firms employing 500 or more engaged in manufacture of ordnance and accessories; chemical and allied products; petroleum and coal products; electrical machinery, equipment, and supplies; and transportation equipment. Persons whose chief work is with electronics need to possess knowledge of the following:

basic electrical and electronic circuits, high-voltage power supplies, power supply regulation, control circuit oscillators, voltage discrimination, modulation and demodulation, impedance and network matching, triggering circuits, wide band amplifiers, linear and log amplifiers, and multiplication and function generation.

3908. WALSH, JOHN PATRICK. *Qualifications, Preparation, and Competencies of Trade and Industrial Teachers.* Ed. D. 1958, The George Washington University, 468 p. 2 vols. L. (Washington, D.C.)*

Purpose of Study: To examine critically existing requirements for the certification of trade and industrial teachers and all elements of the existing program for their training. To identify, define, and evaluate the functions and competencies considered necessary for successful trade teaching. To provide or identify ways and means of achieving teacher training curriculum revision to develop the necessary levels of competence.

Source of Data: Committee discussions and conferences, national association reviews, staff conferences, interviews, jury validation techniques, questionnaire utilization, analysis of legal documents, and a national conference for the purpose of summarizing and analyzing the findings of the study. Respondents to the several questionnaire phases of the study included a sample of successful teachers, local administrators, and supervisors of trade and industrial subjects, and the population of State supervisors and teacher trainers of trade and industrial education.

Findings and Conclusions: The analysis of State certification requirements for trade and industrial teachers indicated that extremely wide variations occur across the Nation in established minimum requirements for such certification categories as basic education, trade experience, and professional education. Trade experience requirements, while showing less variation than professional education requirements, are not clearly defined in any of the States. It was indicated that certification standards should be determined through a systematic analysis of competencies needed by trade and industrial teachers.

There were three basic organizational plans for the preparation of teachers of trade and industrial subjects, namely: (1) Designation of a college or university as a State teacher training institution, (2) appointment of a State teacher training staff, (3) assumption of the function of teacher training by the State supervisory staff for trade and industrial education.

Recommendations: In the light of the increasing mobility of trade and industrial teachers, consideration must be given to the development of common patterns in teacher preparation and certification in order to bring about reciprocity of certification among the several States. An effective program for the training of trade and industrial teachers should provide for the necessary elements of general education, specialized professional education, and teaching field preparation, coupled with direct professionalized experiences to develop the competencies listed.

3909. WHITE, ALVIN M. *Vocational Education Needs of the People of Dent County, Missouri.* Ed. D. 1958, University of Missouri, 116 p. L. (Columbia)*

Purpose of Study: To ascertain the vocational education needs of the people who reside in Dent County, Missouri, and also of those who leave the county.

Source of Data: Information forms sent to 650 former students who either graduated or dropped out of Salem High School during the school years 1945–46 to 1954–55. Simple statistical procedures were used in the study.

Findings and Conclusions: A large majority of the former students had left Dent County in search of jobs. The former students who lived in Dent County had taken less education than the ones who had left. Eighty-one percent of the former students who had taken vocational agriculture in Salem High School were working outside the occupation for which they were trained. The former students were in favor of teaching vocational education classes on the high school level. There was a need for a trades and industries program in Salem High School. Better vocational guidance was needed in the selection of students for vocational training and their subsequent placement.

3910. WIGEN, RAY ARTHUR. *Technical Offerings for Industrial Arts Teachers at the Graduate Level.* Ph. D. 1957, University of Minnesota, 172 p. L. (Minneapolis)

Purpose of Study: To ascertain the nature of technical offerings to determine a legitimate and essential basis for the inclusion of technical offerings in the preparation of industrial arts teachers, and to prepare a guide for administrators and others interested in technical offerings for industrial arts teacher education at the master's degree level.

Source of Data and Methods of Study: The literature was surveyed to obtain the data to characterize the specific nature of technical work at the graduate level. The general theories of technical work at the graduate level were characterized in terms of expected behavior patterns and learning experiences.

These items were prepared in form of a survey instrument for evaluative purposes. The items were evaluated by experienced men in the field of graduate industrial education. As a result of this procedure a guide was prepared for developing or evaluating technical offerings at the graduate level.

Findings and Conclusions: A guide was developed for devloping or evaluating technical offerings at the graduate level for the preparation of industrial arts teachers. Comments by respondents who used the guide for evaluating technical courses indicated that the guide was effective.

3911. **WILCOX, T. GLADE.** *Development of Criteria for the Evaluation of Local Programs of Trade and Industrial Education.* Ed. D. 1957, University of Indiana, 236 p. L. (Bloomington)

Purpose of Study: To provide criteria appropriate for use in the evaluation of local programs of trade and industrial education.

Source of Data: The initial data were selected from literature containing authoritative statements of labor, management, and education concerning positions taken with reference to vocational-industrial education. From this population distinctive statements were developed. The criteria were then developed by placing the distinctive statments in groups of like concept and phrasing each of the concepts as a positive statement.

Findings and Conclusions: Fifty-six of the 60 criteria that were developed were found to be significant. Of these 56 acceptable criteria, 41 were within a one-standard deviation significance level on an arbitrary scale, and 52 were acceptable at two sigmas. Rating scales that are currently in use include irrelevant items. Several of the older tenets of vocational education rated below what might have been expected.

3912. **WILLIAMS, WILLIAM ANDREW.** *Present Status and Preferred Practices in Safety Education in Pennsylvania Vocational Industrial School Shops.* Ed. D. 1959, University of Pittsburgh, 168 p. L. (Pittsburgh, Pa.)*

Purpose of Study: To determine the present status and preferred practices of safety education in Pennsylvania vocational industrial school shops with implications for teacher education.

Source of Data: A checklist of 181 shop safety practices, classified under 9 headings was submitted to all vocational industrial shop teachers and administrators in Pennsylvania, as well as to a jury of experts from 12 States. Rank orders were established for the safety practices and correlation techniques employed for comparing the preferences of the three groups of respondents.

Findings and Conclusions: The study revealed that there are many safety practices which Pennsylvania vocational industrial shop teachers and local administrators agree on as desirable practices to employ in shop safety programs. Of the 181 practices submitted on the checklist, 221 shop teachers rated 167 items as preferred practices, while the 64 local administrators rated 164 items as preferred practices. There was also a high degree of correlation in the opinions of the local administrators, the shop teachers, and the jury of experts with regard to the rank order of importance of the 181 safety practices. The study also revealed that there was a high degree of relationship between preferred practices and actual practices in some instances; however, many actual safety practices lagged considerably behind the preferences of shop teachers.

3913. **WILLIAMSON, MERRILL D.** *Status and Trends of Adult Education in the Public Schools of Missouri.* Ed. D. 1958, University of Missouri, 256 p. L. (Columbia)*

Source of Data: (1) Records and reports of the Missouri State Department of Education and (2) information forms sent to: students enrolled in adult courses in vocational agriculture, homemaking, distributive education, industrial education, and general adult education in selected public schools in Missouri; administrators in public schools having adult education programs; administrators in public schools having limited or no adult education programs; and lay leaders in communities having limited or no adult education programs.

Findings and Conclusions: Administrative practices in adult education in the public schools of Missouri vary considerably within certain well-established limits. Enrollment in reimbursable adult education has remained relatively constant during the past 5 years while enrollment in nonreimbursable adult education has increased 18 percent. Problems faced by public school administrators in developing adult education programs vary in degree rather than in kind. Although the educational needs of adults among the various communities are similar, many of the smaller communities have neither the financial resources nor a sufficient demand for adult education to make it feasible to offer adult education in areas other than vocational agriculture. Adult students, lay leaders, and public school administrators tend to favor the use of State funds and to oppose the use of local tax funds for the support of adult education; they are most favorable to the use of Federal, State, and local funds in combination with student fees. The instruction adult students are receiving is generally good and is meeting their needs to a high degree.

3914. WOODEN, RALPH LEE. *Industrial Arts in the Public Secondary School Program for Negroes in North Carolina.* Ph. D. 1956, The Ohio State University, 192 p. L. (Columbus)

Purpose of Study: To ascertain the status of industrial arts in the public secondary school programs for Negroes in North Carolina, and to develop a program in the light of acceptable criteria. An ultimate objective is to make recommendations for the improvement of industrial arts for Negroes in North Carolina.

Source of Data: The need for industrial arts in North Carolina was ascertained from the State education commission and a survey of research. Standards for industrial arts programs were obtained from 12 State departments of education.

A criterion for evaluating the industrial arts program of the public secondary schools in North Carolina was derived and schools were evaluated.

Findings and Conclusions: Industrial arts should be provided on the elementary, secondary, college, and adult level. All boys and girls should be encouraged to elect industrial arts. The curriculum should include drawing, manufacturing, construction, power and transportation, management and services. Advisory committees with representatives from education, industry, and government should be appointed to help plan and develop the program. Students should receive instruction in labor, management, and employment, with stress on consumer literacy and use of leisure time. Teacher education programs should provide preparatory and inservice experiences for teachers paralleling the type of program required in North Carolina.

3915. WORTHINGTON, ROBERT M. *Factors Affecting the Delayed Imitation of a Demonstrated Psychomotor Skill.* Ph. D. 1958, University of Minnesota, 167 p. L. (Minneapolis)

Purpose of Study: To test experimentally certain factors affecting learning from a demonstration.

Source of Data and Methods of Study: The experimental task consisted of five polygons of birchwood, ¾ in. thick. When assembled each formed a square of 8 x 8 in. There were 14 experimental treatments in the design; 7 used a simple assembly task and 7 used a complex assembly task. Relative complexity of the tasks was determined by a pilot study. Subjects having a demonstration were compared with those having no demonstration.

Findings and Conclusions: The demonstration reduced the time required to learn the assembly task by delayed imitation. This reduction in time was statistically significant. The demonstration reduced the time required to learn the complex task to a much greater degree than the time required to learn the simple task.

Verbalization of key elements accompanying the demonstration did not significantly reduce the time required to learn either the simple or the complex task. Level of delay did not significantly affect the time required to learn these assembly tasks.

The lack of significant correlation between time scores and control variables indicated that the demonstration equalized the effects of IQ, chronological age, and mechanical ability.

3916. YOHO, LEWIS WILBUR. *Analysis of Functions Performed in Operating a Local Program of Vocational and Practical Arts Education in Indiana.* Ed. D. 1959, Indiana University, 277 p. L. (Bloomington)*

Purpose of Study: To analyze functions performed in operating local programs of vocational and practical arts education relative to organizational structure, operational relationships, and perceived roles in crucial or potentially crucial situations.

Source of Data and Method of Study: Data were secured by interviews with all top vocational and practical arts administrators and with vocational teacher trainers in Indiana. Communities were categorized by number of vocational officials employed, comparisons were made of action, importance, personnel involved, and type of roles performed. Actions in crucial or potentially crucial situations were identified and compared with recommendations of the teacher trainers. Action profiles of various personnel were plotted.

Findings and Conclusions: Local administrators were employed 11 to 12 months per year and were working more than 48 hours per week, yet they needed more assistants. They generally reported directly to superintendents, but no consistent pattern of relationship to school principals was evident. Superintendents generally placed vocational administrators below high school principals in responsibility and authority as measured indirectly by salaries paid. Teacher-supervisor ratios were developed as a possible measure of need for supervisory assignments.

An analysis of communities by categories revealed considerable differences in importance of function and in means of performing the functions.

Corrective action for crucial or potentially crucial situations tended toward the cooperative action of all school officials and emphasized the importance of written policies, guides and standards. The teacher trainers were not consistently in agreement on action or on means employed and suggested greater cooperative participation than that revealed by practicing officials.

3917. ZANKOWICH, PAUL. *The Craftsmen of Colonial New York.* Ed. D. 1956, New York University, 609 p. L. (New York)*

Purpose of Study: To investigate and portray the craft life of colonial New York City from the departure of the Dutch (1664) through the period of English occupation of the city and into the early days of the Federal period.

Source of Data and *Method of Study:* Data were obtained by the historical method, from many original sources such as the newspapers of the day, wills, letters, journals, and ledgers of the craftsmen, bills, minutes of such institutions as the Common Council, and Trinity Parish.

Findings and Conclusions: There was in colonial New York a rich and varied craft life and a developing reliance upon the American craftsmen as opposed to the importation of foreign craft products. A functional program of apprenticeship had developed, and craftsmanship had advanced to the point of producing such a figure as Duncan Phyfe and such a monument as St. Paul's Chapel. The study closes at the turn of the century with an indication that there were already forces operating that would result in a decline of craftsmanship in the years to follow.

MASTER'S STUDIES

3918. ABELS, LAVERNE J. *Selected Woodworking Projects—A Compilation of Suggested Woodworking Projects From Selected Southern California Schools and an Index to Preferred Projects Appearing in the Professional Publications.* M.A. 1956, San Diego State College, 129 p. L. (San Diego, Calif.)

Purpose of Study: To compile a list of selected woodworking projects from selected schools in Southern California and to index the more desirable projects that have appeared in professional publications in the field of industrial arts.

Source of Data: Literature pertinent to the study and a survey of schools.

Findings and Conclusions: A list of selected woodworking projects is presented, together with an index to some of the more desirable projects that have appeared in professional publications in the field of industrial arts.

3919. ADAMS, ALVIN PORTER. *Instructional Procedures for Teaching Industrial Arts General Shop.* M.A. 1959, Northeast Missouri State Teachers College, 77 p. L. (Kirksville)

Purpose of Study: To ascertain the most successful procedure for organizing, teaching, and conducting an industrial arts general shop class.

Source of Data: Books and magazine articles in the field of industrial education, and information forms sent to a select group of industrial arts general shop teachers in the State of Missouri.

Findings and Conclusions: Approximately one-half of the instructional procedures discussed were used by more than two-thirds of the teachers questioned. All the teaching methods were used to some extent; however, many were only employed by a few teachers. Most teachers expressed favorable opinions toward methods and teaching devices that they were not using.

3920. ADAMS, ROBERT F. S. *A Comparison of the Effectiveness of Training Films and Teacher Demonstrations as Supplementary Devices for Teaching Related Information in Industrial Arts Electricity.* M.A. 1953, San Diego State College, 70 p. L. (San Diego, Calif.)

Purpose of Study: To ascertain the relative effectiveness of two types of training aids: the sound motion picture and the teacher-made "live" demonstration, when used as supplementary classroom devices, in the teaching of related and technical information in industrial arts electricity.

Source of Data: Books, encyclopedia articles, bulletins, and periodical articles. An experiment was planned and executed in a classroom situation wherein films and teacher demonstrations were used to teach identical items of technical matter in the field of electricity; both methods were compared to traditional textbook methods.

Findings and Conclusions: The experiment reported was a comparison of the effectiveness of the textbook assignment, the training film, and the teacher-constructed live demonstration unit for teaching electricity. Results of the experiment were very close, with the film apparently comparable in effectiveness to the demonstration.

3921. ADDY, BERTRAM FRED. *The Manitoba Apprenticeship Training Program: A Study of the Development, Regulations, Functions and Techniques.* M.A. 1955, University of Minnesota, 128 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To gather and compile information, in concise form, for those interested in and responsible for the Provincial apprenticeship program.

Source of Data: Written reports and forms used in the Manitoba apprenticeship program for observation of training classes, and participation in various committee meetings.

Findings and Conclusions: New conditions will require an expanding program. A careful study of dropouts is needed. Greater use should be made of the trade advisory committees and the services available through the national employment service. More emphasis should be placed on industrial relations, and efforts should be made to stimulate and develop interest in this field.

3922. ADER, VERN LOUIS. *A Follow-up of the Men Who Received the Master of Science Degree in Industrial Education From Stout State College: 1952–55.* M.S. 1956, Stout State College, 42 p. L. (Menominie, Wis.)

Purpose of Study: To follow up those men who received a Master of Science degree in industrial or vocational education during the years 1952–55.

Source of Data: A checklist sent to the male graduates who received a Master of Science degree in industrial or vocational education during the years 1952–55.

Findings and Conclusions: Approximately 80 percent of the graduates involved in the study were employed as teachers. Employers rated the graduates above-average in teaching performance and in personal and professional qualities. Few weaknesses or deficiencies were indicated by the employers.

3923. ADKINS, HOLLACE W. *A Series of Test Items To Check Basic Generalizations of Teaching and Learning.* M.A. 1957, University of Minnesota, 100 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To assist in evaluating certain generalizations concerning concepts of learning, teaching, and education.

Source of Data: A review of the literature in the field of test construction and an analysis of the instructional units for which test items were desired.

Findings and Conclusions: The 10 units were summarized for fundamental concepts of learning, teaching, and education. A series of test items was designed to aid in the learning of these concepts. This material should be of use to students of education and to practicing teachers.

3924. AFFLECK, BERT. *An Evaluation of the Status of Industrial Arts in Accredited Texas High Schools.* M.S. 1957, Eastern New Mexico University, 61 p. L. (Portales)

Purpose of Study: To ascertain the status of industrial arts in accredited Texas high schools and to determine whether this program is being utilized to its maximum potential in meeting the needs of the youth of Texas.

Source of Data: Books, periodicals, and publications pertinent to the subject. Personal contacts were made with teachers, administrators, and various trade schools. A questionnaire was sent out, and the results were used as a basis for comparison between schools within the State.

Findings and Conclusions: Industrial arts teachers should be alert to the demands made by industry for trainees who have a broad background in basic fundamentals of industry. School personnel should keep themselves informed of needs and developments in the world.

3925. ALLEN, JOHN WILSON. *The Status of Industrial Education in the Public High Schools for Negroes.* M.S. 1956, Prairie View A. and M. College, 109 p. L. (Prairie View, Texas)

Purpose of Study: To ascertain the status of industrial education in public high schools for Negroes in Texas.

Source of Data: Questionnaires sent to high schools and informal interviews conducted with high school principals and industrial education teachers.

Findings and Conclusions: There is an increasing number of industrial education programs in public high schools for Negroes. Public schools are beginning to recognize industrial education as an integral part of a complete educational program. Most of the programs are of the industrial arts type. There is a correlation between increased industrialization in Texas and increased emphasis on industrial education.

3926. ALTAMAR-TUNON, ANTONIO. *La Reorganización del Instituto de Artes Mecanicas: Recomendaciones para Satisfacer las Necesidades de Educación Industrial en las Provincias del Interior de la República de Panamá.* M.A. 1956, University of Minnesota, 101 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To make an examination and interpretation of the findings, summaries, conclusions, and recommendations presented by the survey of the Ministry of Education of Panama or the Mechanic Arts Institute.

Source of Data: A vocational survey of the Mechanic Arts Institute and a review of pertinent literature.

Findings and Conclusions: Among the needs of the school are: a better inservice training program, a complementary program of industrial arts, more adequate vocational guidance, an evening school for adults, home economics and business education programs, and an advisory committee for the organization and administration of the school. The vocational agriculture program apparently suits the community.

3927. ASHLEY, TOM. *A Study of Former Trade Preparatory Students of the San Diego Vocational School.* M.A. 1953, San Diego State College, 93 p. L. (San Diego, Calif.)

Purpose of Study: To obtain information concerning the occupational experiences of former trade preparatory students of the San Diego Vocational School.

Source of Data: Literature pertinent to the study and an information form sent to former students of the San Diego Vocational School.

Findings and Conclusions: Forty-three percent of the students obtained employment in the occupation for which they were trained. An additional 25 percent were able to secure employment in the occupational area in which they had taken training. The most significant problem encountered when seeking employment seemed to be inexperience. The majority of the students considered that their occupational choice was satisfactory and felt that this choice had, for the most part, been their own.

3928. AVAKIAN, MARION. *Industrial Arts in the Los Angeles City School Prior to 1900.* M.A. 1955, University of California at Los Angeles, 75 p. L. (Los Angeles)

Purpose of Study: To trace the historical development of industrial arts education in Los Angeles City Schools.

Source of Data: U.C.L.A. Library, records of Los Angeles City Schools, Los Angeles City Library, catalogs, theses, and personal files.

Findings and Conclusions: By 1900 industrial arts was an important and successfully established feature of the Los Angeles school system and had a promising future.

3929. BACHELDER, ROBERT OSTROM. *The Structure and Extent of the Army Crafts Program in the United States.* M.A. 1957, University of Minnesota, 105 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To place the Army Crafts Program in perspective regarding its value to the soldier; to provide a reasonably complete and accurate picture of the program as it exists in the United States today; and to provide a basis for further study and/or improvement and expansion of the present program.

Source of Data: Background material on the Army, recreation, and crafts; official Army bulletins and regulations concerning special services and crafts; personal correspondence with Army Crafts Program supervisors; crafts facilities questionnaires mailed to installation crafts shops; and personal observation of the writer as an enlisted man assigned to crafts shops at Fort Leonard Wood, Missouri, and Sandia Base, New Mexico.

Findings and Conclusions: Crafts activities are of great value to the serviceman. The Army Crafts Program needs and deserves more publicity and support for desired growth. The employment of trained civilian crafts personnel greatly enhances the program. Most of the major Army posts in the United States have a crafts program; woodworking, leathercraft, and photography are the most popular crafts in it. More automotive hobby shops are needed. There is a need for more communication among the Army program personnel throughout the country. The possibility of a civilian counterpart to the program should be investigated.

3930. BAGLEY, RONALD E. *A History of the Industrial Arts Department at the Northeast Missouri State Teachers College.* M.A. 1959, Northeast Missouri State Teachers College, 110 p. L. (Kirksville)

Purpose of Study: To trace the growth and development of the Industrial Arts Department of the Northeast Missouri State Teachers College from its inception through the year 1958.

Source of Data: The campus of the Northeast Missouri State Teachers College: biennnial bulletins, college yearbooks, school newspapers, and personal interviews with persons directly related to the problem.

Findings and Conclusions: The department was established on the campus in 1900. Its main purpose was not primarily the preparation of secondary teachers as is common today, but rather to offer courses for elementary or rural school teachers. This was the reason for more women students in the department and also for women on the faculty. The most common minors for industrial arts majors were agriculture, physical education, business, social science, and science. The department has steadily grown as to the number of students enrolled in the department and the number majoring in industrial arts. The earlier offerings of the department emphasized the development of tool skills but did not include related information, as the present department does.

3931. BAKER, VIRGIL LeROY. *Modern Transparent Wood Finishes Used in Industrial Arts Classes.* M.A. 1958, University of Wyoming, 99 p. L. (Laramie)

Purpose of Study: To obtain information concerning modern wood finishes, principal stains, wood fillers and sealers, modern cabinet woods, manufacturers of wood finishes, and slide films on wood finishing.

Source of Data: A review of literature, contact of all companies which manufacture wood finishing products, and theses dealing with wood finishing, etc.

Findings and Conclusions: It is necessary to know the characteristics of wood prior to finishing for good results. In the wood finishing process, staining and bleaching come first. The findings indicate that for industrial arts classes, nonraising of grain stains are best; lacquer finishes are better than varnish finishes; dust-free rooms should be used; surface finishes are being replaced by penetrating finishes; and best results are obtained from nationally known products.

3932. BALDRIDGE, ROBERT BERNARD. *Fire Protection Education.* M.S. 1957, Oklahoma State University, 109 p. L. (Stillwater)

Purpose of Study: To obtain data concerning the courses and level of training offered in fire protection throughout the United States.

Source of Data: A sample test which was conducted to ascertain the level of fire protection education that the average student possesses.

Findings and Conclusions: The various States offer only a limited number of courses in fire protection education. The majority of the States that offer courses do not include fire protection education in the State-required curriculum. The results of the survey conducted at the Stillwater Junior High School clearly indicate the students' knowledge of fire protection is on an extremely low level. The only possible way the United States can reduce the needless loss of life and property damage is to adequately educate the youth of the Nation in fire protection.

3933. BARNES, JAMES WENDELL. *Metal Finishes Applicable to the School Shop.* M.S. 1955, Oklahoma State University, 51 p. L. (Stillwater)

Purpose of Study: To determine practical finishing methods and materials for metalwork.

Source of Data: Unpublished studies and periodicals related to metal finishing.

Findings and Conclusions: There are many industrial finishing processes which can be adapted to the school shop. Metal finishes can be enhanced by using electroplating. Vitreous coatings are easily applied to small metal objects and represent a parallel to industrial experiences.

3934. BARRS, HERMAN D. *A Study of the Opinions of the Graduates of Denton Senior High School, Denton, Texas, Concerning the Practical Arts.* M.S. 1957, North Texas State College, 72 p. L. (Denton)

Purpose of Study: To obtain and analyze the opinions of 415 graduates of Denton Senior High School concerning the values of industrial arts and homemaking.

Source of Data: Questionnaires returned by students who graduated during the school years 1950 through 1955.

Findings and Conclusions: A large majority of the graduates expressed a need for broader knowledge of industrial arts and home economics. Approximately one-third of the male graduates who took industrial arts in high school attended college and majored in industrial arts. The majority of the graduates who did not take courses in industrial arts or home economics in high school believed that one or more of such courses would have been of value to them. A majority of the graduates who had taken industrial arts and home economics in high school expressed the opinion that the courses should be expanded.

3935. BEAL, DANIEL H. and KAUMEHEIWA, ALSON I. *Production Techniques in an Industrial Arts Metalworking Class.* M.A. 1959, University of Minnesota, 124 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To ascertain the feasibility of a production unit in achieving the objective "interest in industry." The study is also designed to provide information for classroom teachers interested in conducting a unit in mass production.

Source of Data: Periodicals and textbooks on industrial techniques and types of production. Experience gained in a course on production and automation proved invaluable as a source of production experiences. The class was made up of experienced teachers who indicated methods, experiences, and solutions employed in their classes. Finally, research data was compiled from a secondary school class in which a production unit was conducted.

Findings and Conclusions: A mass production unit is a teaching technique which naturally involves understanding of industry by students. It is highly motivating and lends itself readily to such educational objectives as cooperation, application of principles, development of skills, planning, and problem solving. However, more studies could be done on the success of other techniques that achieve the objective "interest in industry." The success encountered in using a mass-production unit indicates a functional method of meeting objectives set up by industrial arts instructors; however, there is a need for more texts in this area and also for further study on evaluation materials applicable to this type of unit.

3936. BEALS, ROGER ALEX and WAMBERG, DALE WILLIAM. *Evaluation in Basic Woodworking.* M.A. 1956, University of Minnesota, 165 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To provide a resource file of good objective test items in the field of woodworking; to emphasize methods of improving observation techniques in the woodworking shop; to discuss the use of object and manipulative performance tests and illustrate each; to provide a systematic approach to evaluating finished projects.

Source of Data: A review of the literature available in the fields of industrial arts and evaluation.

Findings and Conclusions: The study is a presentation of the various types of evaluative instruments used in woodworking. Many objective-type test items measure the retention of facts only, rather than the application of things learned. Evaluation must improve the school instruction; therefore, there is a need for the development of new methods of evaluation by the woodwork teacher.

3937. BECK, CALVIN R. *A Photographic Record of Physical Facilities for Teaching Industrial Arts in Selected Utah Schools Showing Trends in Their Development.* M.S. 1958, Utah State University, 247 p. L. (Logan)*

Purpose of Study: To ascertain the nature and type of facilities Utah has for the teaching of industrial arts; to show that industrial arts facilities in Utah have been undergoing changes; and to indicate briefly the transition that has occurred in certain selected schools.

Source of Data and Method of Study: Interviews with superintendents, principals, teachers, custodians, and retired teachers from 22 schools throughout Utah. An interview form was used, and questions were asked directly from this form. Where information could not be obtained by interview, letters were sent to key persons with a list of the specific information requested. School yearbooks and histories were also used. Photographs taken by the writer are included in the study report.

Findings and Conclusions: Although many schools have been provided with adequate facilities for the teaching of industrial arts, the study revealed that the majority of the schools needed to have facilities modernized if they were to have the type of program desired by the teachers and in keeping with current trends. This is substantiated by photographs of the industrial arts facilities at all of the schools included in the study. Wherever possible, photographs were taken from yearbooks, older photographs, old buildings still standing, and any other sources available to show the development of the facilities through the years. It was shown that the industrial arts facilities in the selected schools had undergone considerable changes. The study showed that administrators recognized the value of adequate industrial arts facilities and that an effort was being made to provide housing and equipment which would be conducive to good industrial arts instruction.

3938. BECHER, VERN R. *A Survey and Evaluation of Driver Education in Utah Secondary Schools.* M.S. 1953, Utah State University, 112 p. L. (Logan)*

Purpose of Study: To evaluate the driver education programs being taught in the secondary schools of Utah.

Source of Data: A questionnaire mailed to 78 high school principals, personal interviews and letters, and evaluative criteria taken from available sources.

Findings and Conclusions: The majority of the respondents felt that the quality of the program was of primary concern to the teacher. Only one-half of the principals felt they had a qualified person in charge. Over half consult students regarding learning activities. The majority of the schools use a textbook; most use films and other aids; only half of them were giving both classroom and behind-the-wheel instruction. Forty-four percent offer the program in the eleventh grade, 39 percent in twelfth grade, and 14 percent in the ninth grade; 42 offer it as a separate course. The majority do not segregate classes as to sex. Eighty-three percent were using teachers with a general secondary certificate. A plan of evaluation of driver training was not in evidence.

3939. BELISLE, HUBERT EDGAR. *A Follow-up Study of Graduates of Northwestern State College With a Major in Industrial Arts (1946 Through 1956).* M.S. 1958, Northwestern State College, 90 p. L. (Natchitoches, La.)

Purpose of Study: To ascertain the professional status and location of the industrial arts graduates of Northwestern State College, to obtain some measure of the effectiveness of the training they received and to furnish, on the basis of evaluation, data upon which authorities might justify changes in the present curriculum.

Source of Data: Names and addresses of the industrial arts graduates prior to 1956, obtained from the files in the Industrial Education Department of Northwestern State College. Data were obtained from an 86 percent return of questionnaires.

Findings and Conclusions: Approximately one-third of the respondents were employed in educational work, one-third in industry, and one-third in other fields. Present mean annual salaries were: Education, $4,228; industry, $5,611; other fields, $4,452. Most graduates evaluated the training received as helpful in present employment. Engineering, drawing, and professional industrial arts courses were rated very high by graduates. Many felt they should have taken descriptive geometry and business principles. Mathematics was considered to be the best minor field of study for an industrial arts major.

3940. BENGTSON, LEONARD EMIL. *Entrance Age and Achievement of Disabled Veterans at Iowa State College.* M.S. 1956, Iowa State College, 31 p. L. (Ames)

Purpose of Study: To investigate the relationship between the age and the academic achievement of disabled veterans attending Iowa State College.

Source of Data: The Registrar's office, Iowa State College, and the Veterans Administration Office, Des Moines, Iowa—data on 350 disabled veterans.

Findings and Conclusions: No significant differences were found between the grade-point averages of the 4-year age groups; therefore, no evidence was found to indicate a relationship between age and academic achievement of disabled veterans at Iowa State College.

3941. BENTALL, STANLEY. *The Predicting Achievement of Sophomore Students in First Semester Mechanical Drawing in the Central High School, Sioux City, Iowa.* M.S. 1955, Iowa State College, 26 p. L. (Ames)

Purpose of Study: To ascertain the usefulness of the mean semester marks in ninth-grade English and social studies and in eighth-grade industrial arts in developing a regression equation for predicting achievement in first semester senior high school mechanical drawing.

Source of Data: A sample of students enrolled in the Central High School, Sioux City, Iowa.

Findings and Conclusions: English and industrial arts marks constituted the best two variable combinations with a coefficient of 0.6414.

3942. BERAN, DONALD CHARLES. *Trends in Reimbursed Trade and Industrial Education Programs in Michigan From 1936 to 1959.* M.A. 1960, The University of Michigan, 59 p. L. (Ann Arbor)

Purpose of Study: To ascertain the major changes or general trends that have taken place in reimbursed trade and industrial education programs in Michigan from 1936 to 1959. A subsidiary purpose was to bring up to date the history of the development of trade and industrial education in Michigan for the same period of time.

Source of Data: A questionnaire was sent to each city in Michigan that maintained a reimbursed trade and industrial education program. The Director of Vocational Education, the coordinator, or the high school principal received and answered the questionnaire. Junior college programs which are reimbursed were included also. Enrollment statistics for 1936 were procured from *The Development of*

Industrial Education in Michigan by F. W. Dalton (1940). Present enrollment figures were acquired from the questionnaire and verified by the records of the State Department of Public Instruction, Department of Vocational Education.

Findings and Conclusions: The expansion of reimbursed vocational education has been slow since 1950. There are more schools offering reimbursed programs in Michigan now than in 1940; but since 1948, the total number of students in these programs has been declining. Machine shop is the course most often elected by the student. Where courses have been added recently or are under development for offering in the near future, the trend is toward courses more technical in nature, such as electronics, hydraulics, pneumatics, or power mechanics.

It was concluded that reimbursed programs are shifting toward post-high school level. High schools are leaning toward general education, and the community college will have to train people for special vocations and technical skills.

3943. BINGHAM, ELMONT L. *A Study for the Purpose of Ascertaining the Basic Units of Instruction for a Unified Drafting Program in Utah High Schools.* M.S. 1959, Utah State University, 63 p. L. (Logan)

Purpose of Study: To find out what value high school instructors and industrial draftsmen in Utah placed upon each major unit of instruction in a mechanical drawing program. To ascertain what units of instruction were being taught, the number of class periods devoted to each unit, and whether a unit sequence was being followed by the teacher. To obtain suggestions from industrial draftsmen on the units which should be taught and the number of class periods which should be devoted to each.

Source of Data: Personal interviews with 24 industrial arts instructors who met the conditions that qualified them for the study. A form was used in conducting the interview. Personal interviews were also held with six leaders of industry and the same techniques were used.

Findings and Conclusions: Most of the high school drafting teachers of Utah and the representatives of industry were unified in their opinions on the value of the units of instruction. Most representatives of industry did not feel qualified to suggest a sequential order for teaching the units and the State-approved textbook does not follow a sequence favored by the majority of the high school instructors. In general, the representatives of industry agreed with the teachers on the number of class periods that should be spent on each unit. Some differences of opinion existed among teachers regarding time to be spent on each unit, for schools of smaller enrollment usually offered only one year of drafting, while larger schools could offer a two-year course.

3944. BJORKQUIST, DAVID CARL. *Curricular Needs of Iowa High School Industrial Arts Students as Reported by Their Teachers.* M.S. 1957, Iowa State College, 88 p. L. (Ames)

Purpose of Study: To ascertain the curricular needs of industrial arts students as reported by Iowa high school industrial arts teachers and to ascertain whether there were community characteristics and personal characteristics of the teacher which affected the student needs reported by the teacher.

Source of Data: A questionnaire sent to 174 full-time industrial arts teachers in Iowa, who rated 32 needs which high school students were presumed to have in the industrial arts area.

Findings and Conclusions: The teachers rated needs which were of a general nature and which were not necessarily dependent on industrial arts for their satisfaction as most important. The needs which were more vocational were rated lowest. Few significant differences were found between groups of teachers when they were stratified on the basis of community and personal characteristics.

3945. BLOSSER, CHARLES RUSSELL, Jr. *A Study of Glass Processing With Suggestions for Employing Glass as an Industrial Arts Medium.* M.A. 1958, Kent State University, 209 p. L. (Kent, Ohio)

Purpose of Study: To present an overview of the manufacturing techniques employed in the glass industry, and to provide information concerning the nature and characteristics of glass, and procedures for working with glass in the industrial arts laboratory.

Source of Data: Books, periodicals, correspondence with representatives in various areas of the glass industry, and personal plant visits. Procedures for manipulating glass in the industrial arts shop were developed through empirical investigation and experimentation.

Findings and Conclusions: Glass can be successfully used as a teaching material in the ceramics shop. It may be blown, form draped, sandblasted, acid etched, glue etched, ground and polished, drilled, silvered, decorated with glass colors, and fabricated in the ceramics shop. Much of this may be done with equipment ordinarily found in a ceramics area, or may be constructed by the instructor at a nominal cost.

3946. BODINE, MERLE W. *The Areas of Training Needs of Highly Skilled Technicians in Twenty-three Selected Kansas Industries.* M.S. 1959, Kansas State College of Pittsburg, 255 p. L. (Pittsburg)

Purpose of Study: To ascertain the various areas of technical skill and knowledge required of presently employed technicians in selected Kansas manufacturing and processing firms, and in doing so, develop a pattern of procedure for continuing to obtain and interpret this kind of information.

Source of Data: Personal interviews with technical representatives in 23 selected Kansas industries.

Findings and Conclusion: The work activities and related information of 830 highly skilled technicians in 42 different job titles were ascertained and recorded. The characteristics of these activities and knowledge for six groups of technicians were emphasized. The common and unique characteristics were also defined and emphasized.

3947. BOWLDS, HAROLD EMMETT. *Status of Trade and Industrial Instructors in Colorado.* M. Ed. 1957, Colorado State University, 67 p. L. (Fort Collins)

Purpose of Study: To ascertain the status of all-day trade and industrial instructors in Colorado with respect to: Education; practical work experience; professional growth; and participation in educational, professional, civic, and social associations, societies, or groups.

Source of Data and Method of Study: Data were secured from 67 all-day trade and industrial instructors through a questionnaire and by personal interview and review of literature. The descriptive method with fact-finding purpose was used.

Findings and Conclusions: It was found that: Each of the 67 all-day trade and industrial instructors exceeded the basic occupational experience requirement for employment as an instructor; more than one-half of the instructors were over 45 years of age, and 29 percent had received the bachelor's degree;while only two occupations involving 4 instructors indicated no professional improvement after employment, there might be a need for encouragement for more instructors to work toward professional degrees; there was widespread participation in various associations, societies, and groups.

3948. BOYCE, HARLAN WALWORTH. *Age and College Achievement of Public Law 346 Veterans at Iowa State University.* M.S. 1959, Iowa State University, 27 p. L. (Ames)

Purpose of Study: To ascertain the value of age in predicting achievement of Public Law 346 veterans at Iowa State University.

Source of Data: The registrar's records at Iowa State and, in alphabetical order, every tenth Public Law 346 case in the registrar's files. Only males with no previous college experience who were graduates of U.S. secondary schools and who had enrolled as freshmen in full-length curriculums were included in the sample.

Findings and Conclusions: A test for differences of achievement among age groups by the method of analysis of variance (single classification) yielded an F-value of 1.92 significant at the 5-percent level.

Comparison of mean sum of squares for linear regression with mean sum of squares for grouped data yielded an F-value of 2.06, significant beyond the 5-percent level, which indicated a tendency toward nonlinear relationship. However, the quadratic regression equation proved to be of little practical value as a predictor of achievement from age as indicated by a nonsignificant F-value of 0.757 found by analysis of quadratic regression. Therefore, on the basis of this investigation, there was no indication that older Public Law 346 veterans were less able to achieve than younger students.

3949. BRADLEY, MERRITT E. *A Program of Teacher-Made Tests and Testing Devices for Improving Industrial Arts Education.* M.S. 1954, Utah State University, 157 p. L. (Logan)*

Purpose of Study: To ascertain the practices employed by industrial arts teachers in teacher-made testing devices, testing, test checking, and analysis of tests.

Source of Data and Method of Study: Questionnaires were sent to industrial arts teachers throughout Utah. The teachers were encouraged to contribute their ideas concerning testing devices, self-administered tests, quiz boards, and checking and scoring devices. Each teacher who indicated willingness to contribute some testing device was visited personally.

Findings and Conclusions: Most of the industrial arts teachers who responded to the questionnaire considered a good testing program to be an important part of industrial arts instruction. It was their opinion that the most important function of a good testing program was to improve instruction. Assigning marks was given as the second most important function. Student and teacher preferences for types of test items were reported.

Testing aids and devices were in common usage by industrial arts teachers in Utah. Interest in them seemed to be increasing.

3950. BRO, RONALD DEAN. *An Evaluation of Various Methods of Teaching Industrial Arts Design on the Secondary Level.* M.A. 1958, Iowa State Teachers College, 157 p. L. (Cedar Falls)

Purpose of Study: To obtain expert opinions on the value of various methods, techniques, and procedures of teaching design in industrial arts and make recommendations based upon the data presented.

Source of Data: A checklist containing 40 methods of teaching industrial arts design was sent to teachers who had been named by State supervisors as outstanding in the teaching of industrial arts design.

Findings and Conclusions: There were 21 different methods of teaching industrial arts design rated by 63 to 94 percent of the respondents as being either of "much value" or "especially helpful."

3951. BROWN, GUS HENRY. *A Study of Relations of Vocational Interest to Intelligence, Mental Abilities, Curriculum Offerings and Occupational Opportunities of the Ninth Grade in Gibbons High School, Paris, Texas.* M.S. 1956, Prairie View A and M College, 60 p. L. (Prairie View, Texas)

Purpose of Study: To determine whether or not there is a relationship between (1) vocational choices and intelligence, (2) vocational choices and expressed interest, (3) vocational choices and physical fitness, and (4) vocational choices and vocational opportunities of ninth grade students in Gibbons High School, Paris, Texas.

Source of Data: Three professionally prepared tests and three teacher-made instruments administered to all ninth grade students in Gibbons High School.

Findings and Conclusions: A significant relationship was found between vocational choices and interests. Very little relationship was found between vocational choices and intelligence, opportunities, or physical fitness.

3952. BUMGARDNER, BILL M. *A Rural Community Helps to Determine Industrial Arts Content for the Reading Rural High School, Reading, Kansas.* M.S. 1957, Kansas State Teachers College, 76 p. L. (Emporia)

Purpose of Study: To form a basis on which an industrial arts program could be established in part, indicating those items which parents and graduates desired students to obtain through such a program.

Source of Data: Questionnaires completed by men who had graduated from Reading Rural High School through the years 1940–50, and personal interviews conducted with parents of students at present enrolled in that school.

Findings and Conclusions: Parents and graduates are concerned about giving the present students of the Reading Rural High School experiences which will help them to cope more successfully with modern life. They indicated five objectives to which they felt an industrial arts program should contribute.

3953. BUSHMAN, H. KEITH. *A Comprehensive Study Evaluating Driver Education in the Senior High Schools From Analyses of Driving Records of Salt Lake City High School Students.* M.S. 1954, Utah State University, 52 p. L. (Logan)*

Purpose of Study: To compare the driving records of Salt Lake City high school students who had received training in driver education and students who had not received driver training, in terms of violations and accidents.

Source of Data and Method of Study: A list of all students who had completed the driver education course during the years 1948 through 1951 were matched against a group of untrained students attending the same high schools in Salt Lake City during the same years. The names of all students were checked with the driver's license department to obtain information about violations, convictions, and accidents.

Findings and Conclusions: The driving performance records of those who received driver training were significantly better than those of a matched group who had not received driver training. Fewer trained drivers were involved in or had accidents. Fewer trained drivers were involved in or guilty of violations. Fewer trained drivers were called in for special examinations and suspension of licenses. The trained driver group had a 32.2 percent reduction in accidents and a 28.9 percent reduction in the number of violations. The types of violations of both groups followed nearly the same pattern, except for speeding and running through stop signs, cases in which the number of violations was larger for the untrained group. Driver training was not 100-percent effective in eliminating accidents and violations.

3954. BYRD, EVERETT. *Left-Handedness As It Affects Industrial Arts Students.* M.S. 1956, Oklahoma State University, 58 p. L. (Stillwater)

Purpose of Study: To find the percentage of students who are left-handed and develop methods and procedures to deal with their problems.

Source of Data: A questionnaire to high school and college students in Oklahoma, interviews with left-handed persons, and published materials.

Findings and Conclusions: The left-handed person is not abnormal. Left-handed individuals enjoy advantages in some fields. The percentage of left-handed individuals is increasing. Forced change of handedness may present difficult maladjustments. Instructors are aware of the problems encountered by their left-handed students. Some of the suggestions for helping left-handed students are: Give individual instruction, encourage left-handed students to enroll in shop classes, provide left-handed tablet arm chairs, attach vises on right-hand corner of benches, and place the student at work stations so that the light comes over his right shoulder and finally, encourage industrial arts teachers to become more cognizant of the difficulties encountered by left-handed students.

3955. CAMPBELL, ROBERT ASA. *The Problems of Increased College Enrollments with Implications for Industrial Arts Teacher Education.* M.A. 1957, University of Minnesota, 169 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To investigate instructional problems caused by rapidly increasing college enrollments; means being advocated to alleviate these problems; their applicability to industrial arts teacher education; and examples of ways in which they might be used in the areas of woodworking and drawing.

Source of Data: A documentary investigation of current literature to ascertain the actual crisis of enrollment in higher education. A thorough review of the possible solutions advocated by present-day writers of magazines, journals, research studies, and books. Data concerning several research experiments being tested in institutions of higher learning regarding new methods of teaching were obtained from printed literature and from private files.

Finding and Conclusions: The problem created by increased enrollment may be solved in part by putting a larger responsibility on the student for his own learning; revising the curriculum to eliminate nonessential courses and avoid duplication and overlapping; employing nonprofessional assistants to relieve the load on professionally educated faculty members, using mechanical and electronic devices, making variations in class size; reconsidering institutional arrangements that affect faculty work-loads.

3956. CAPP, ROBERT EUGENE. *A Comparison of Drafting Techniques and Practices as Taught in Selected High Schools in Missouri with those Practices Found in Selected Industrial Concerns.* M.A. 1959, Northeast Missouri State Teachers College, 107 p. L. (Kirksville)

Purpose of Study: To compare the drafting procedures taught in selected high schools of Missouri with practices in selected industries of Missouri.

Source of Data: An information form sent to 100 drafting teachers employed in the Class AAA schools of Missouri and to 100 chief draftsmen employed in a variety of industries within the State of Missouri.

Findings and Conclusions: A higher degree of legibility for freehand lettering seems to be required in industry than in schools. Considerably more lettering devices and machines are used in industry than in schools. It also appears that industry employs more short-cut methods such as templates and drafting machines. The differences in dimensioning practices of schools and industry would appear to be only moderate. Drafting teachers should provide for more experiences in shop processes, improve instruction in drafting techniques and lettering skill, develop student efficiency and speed in drafting procedures, and broaden the background of students through the study of mathematics and the sciences.

3957. CARLSON, EDWARD ROBERT. *An Inventory of Selected Teaching Aids for a Basic Drafting Course.* M.A. 1955, University of Minnesota, 59 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To compile information about visual teaching aids as a resource reference for other teachers of drafting so that they might improve their classroom instruction.

Source of Data: The author's classroom and educational textbooks and periodicals.

Findings and Conclusions: A group of techniques which the author has found valuable is presented. By examining this study the beginning teacher may become aware of teaching procedures and techniques that will result in drafting classes which will be more meaningful to the student.

3958. CARLSON, WAYNE CLIFFORD. *An Investigation of Unionism and its Application in Industrial Arts.* M.A. 1959, University of Minnesota, 114 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To describe the important concepts of unionism, identify and describe those unions most closely related to the various fields taught in industrial arts, and indicate how this material can be utilized by the instructor.

Source of Data and Method of Study: Literature was reviewed to develop a philosophy of unionism. Leaders, the different types of unions, and the relationship of labor to education and industrial arts, were studied; a teaching unit on unionism was developed for use in a senior high woodworking class.

Findings and Conclusions: The study showed that the union movement has become a dynamic force in society and that students should be made aware of it. The industrial arts teacher should be thoroughly acquainted with the labor movement and assume responsibility for instruction concerning it.

3959. CARNEY, MORTON ARNOLD. *An Occupational Survey of Twenty-Three Skilled Trades in Austin, Minnesota.* M.A. 1956, University of Minnesota, 53 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To ascertain occupations or skilled trades in the community of Austin, and to obtain vocational information for guidance purposes and for planning educational services for trade preparatory and trade extension training in the Austin Area Vocational School.

Source of Data: Personal interviews.

Findings and Conclusions: It is recommended: that the use of advisory committees be expanded; that a course be added for the training of practical nurses; that a full-time vocational counselor be added to the staff; that the part-time occupational training program be further expanded; that ways and means be explored for recognizing trade preparatory training when graduates are indentured into apprenticeship.

3960. CARR, JOSEPH HARVEY. *Effectiveness of One-Year Program in Vocational Auto Mechanics at Davenport, Iowa.* M. Ed. 1959, Colorado State University, 64 p. L. (Fort Collins)

Purpose of Study: To ascertain the effectiveness of a one-year program in vocational auto mechanics.

Source of Data: A questionnaire sent to local garage owners and supervisors in Davenport, Iowa. The program of vocational auto mechanics was evaluated by applying "Standards for Automotive Instruction in Schools," a criterion devised by a vocational education conference group of the automotive industry.

Findings and Conclusions: There is a definite need for a program of vocational auto mechanics in Davenport, Iowa, since the present facilities are inadequate for the program; 2- or 3-year programs were considered more effective than a one-year program.

Garage owners and supervisors were willing to serve on advisory committees, and it was deemed advisable to form such committees to upgrade the program.

3961. CARSON, HAROLD E. *A System of Records and Accounting for an Industrial Arts Laboratory.* M. Ed. 1955, The Ohio State University, 60 p. L. (Columbus)

Purpose of Study: To develop an accounting system suitable for a general shop situation.

Source of Data and Method of Study: The writer conducted personal interviews, visited other shops, and examined pertinent literature in the field, established criteria and developed a system to meet his needs.

Findings and Conclusions: The system developed, after being in effect for 2 years, proved satisfactory. It is the belief of the writer that the system developed would meet the needs of many general shop situations.

3962. CARTER, R. KEITH. *An Analysis of General Shop Methods With a Suggested Course of Study for the Junior High Schools in Utah.* M.S. 1959, Utah State University, 155 p. L. (Logan)

Purpose of Study: To present a suggested course of study for a general shop program in the junior high schools of Utah, and to present a plan whereby the manner of instruction offered by the general shop may be utilized more fully.

Source of Data and Method of Study: Letters were sent to selected State commissioners of education requesting courses of study or other material pertaining to the general shop on the junior high school level. Data for this study were then taken from information received from various States, from periodicals, from various textbooks, and from existing sources of material on file in the industrial education department at Utah State University. The areas of activity were selected according to popularity as indicated by the various States.

Findings and Conclusions: The general shop is on an upward swing in popularity in certain areas, while in others it is just holding its own or may be on the decline. The decision as to whether or not to use the general shop plan of teaching will be determined by the emphasis given to certain objectives of industrial arts. There are many factors that will need to be given consideration in using the general shop method. Every instructor will need to consider his own situation and select the methods and procedures that will best meet his own needs. There are several methods that are and can be used in starting the class and rotating the students in the general shop.

Materials for a course of study will need to be carefully selected including only the basic and important operations that can be taught in the limited time allotted to each type of activity. To make the general shop more effective, there is a need for adequate teacher preparation in the methods of the general shop. The teacher will need to use different teaching techniques than are now used in the unit-shop method, utilize student organization more effectively, and make better use of printed instructional materials.

3963. CASSILL, HAROLD WILLIAM. *Incorporation of Photographic Technology in the Secondary School Curriculum.* M.A. 1958, The Ohio State University, 95 p. L. (Columbus)

Purpose of Study: To incorporate photographic technology in the secondary school curriculum and to promote the writer's inquiry in this field.

Source of Data: A survey of the literature pertinent to the subject. A study was made of photographic technology giving history, economic importance, and scope. A guide for teaching the photographic technology was developed primarily for the secondary school level.

Findings and Conclusions: The implications of photography for industrial arts includes technological orientation, technical competency, consumer literacy, and recreational or leisure activities. Photography can be utilized both as a unit of instruction in the laboratory of industries and as a club activity in the extracurricular program of the school.

3964. CAVEN, WALTER JOSEPH. *Contributions to Industrial Education: An Annotated Index of Papers.* M.A. 1959, University of Minnesota, 99 p. Department of Industrial Education, (Minneapolis)

Purpose of Study: To furnish an annotated index of the Plan B papers numbered 190 through 260 from June 1952 through June 1957, located at the industrial education department at the University of Minnesota. To make these summaries generally available to undergraduate students, graduates, and others who use these materials.

Source of Data: Plan B papers from June 1952 to June 1957 in industrial education at the University of Minnesota.

Findings and Conclusions: None.

3965. CHAMBLISS, CARNEAL EDWARD. *Industrial Arts Education Curriculum in Selected Negro Colleges.* M.A. 1958, University of Minnesota, 80 p. Department of Industrial Education. (Minneapolis)

Purpose of Study: To ascertain and describe current policies and basic patterns followed in the preparation of industrial arts teachers, to compare the course offerings and 4-year degree requirements for industrial arts majors in Negro schools accredited by the Southern Association of Colleges and Secondary Schools, and to suggest improvements in industrial arts teacher preparation curriculums in these schools.

Source of Data: Catalogs and bulletins of the 12 colleges.

Findings and Conclusions: All colleges studied offered courses in the following areas: Woodworking, drawing, electrical work, and metalwork. All colleges required courses in drawing, student teaching, English, mathematics, science, social sciences, health and physical education, and education.

There were great variations in the industrial course offerings. There was no policy of screeing students who entered the industrial arts teacher preparation programs.

3966. CHAREONCHAI, RUANG. *A Metal Industries Education Program for Thailand.* M.A. 1958, The Ohio State University, 203 p. L. (Columbus)

Purpose of Study: To analyse the present educational and economic resources of Thailand and develop a metals curriculum to reflect technology suitable for Thailand's schools. This is to include a resource study of the metals technology and a curriculum guide of subject matter to be taught.

Source of Data and Method of Study: Bibliographical methods including books, pamphlets, periodicals and theses and dissertations were used for background material on Thailand and for information on metal technology. Correspondence was used both in the United States and abroad for authoritative information. Interviews with visiting Thai teachers and educators were used to discover recent developments in Thai education. Personal observations were made at various schools and metal manufacturing plants.

Findings and Conclusions: On the elementary level, curriculum units in the history and mining of metals could be used with simple manual processes of working metal as orientation. The secondary level would include orientation, technical, cultural, and recreational objectives with emphasis on orientation. Teacher training should receive top priority, as the proposed curriculum will be achieved with great efficiency and the best interests of Thailand served thereby.

3967. CHENOY, U. STERLING. *Student Management Practices in the Secondary School Shops of Utah.* M.S. 1954, Utah State University, 59 p. L. (Logan)*

Purpose of Study: To ascertain the extent of student management practices now in use in the school shops of Utah. The study is limited to the secondary school shops, grades seven through twelve, and to shop courses in woodwork, general metal, electricity, mechanical drafting, and crafts.

Source of Data: Questionnaires of the yes-no type, with space for comments, sent to industrial arts teachers of Utah.

Findings and Conclusions: The reports showed that some shops did not have student managers and other shops were organized with numerous managers assisting the instructor in nontechnical duties. The average was 3.3 student managers for each shop class. Student manager positions, ranked in relation to frequency of use, are: Tool man, superintendent, supervisor of cleanup, bench man, machine man, finishing room attendant, safety foreman, shop librarian, supply checker, and attendance checker. The student management program appeared to offer an excellent opportunity to incorporate the principles of good government in the shop program. Industrial arts instructors believe that student management practices should be used in school shops. A few teachers were definitely opposed. Most teachers believed that the time and effort to prepare and supervise a student manager program was justified.

3968. CHILD, RAWSON D. *A Survey to Determine if the Institutions Teaching Welding are Meeting the Desires of Industry.* M.S. 1953, Utah State University, 85 p. L. (Logan)*

Purpose of Study: To ascertain whether welding as it was taught at Utah State Agricultural College was meeting industry's needs.

Source of Data: A questionnaire sent to industries and institutions.

Findings and Conclusions: The institutions were meeting the desires and needs of industries for subject and skills of the following: Engineers—83.9 percent; technicians—71 percent; and welders—80.6 percent.

Engineers should know and understand the technical subjects related to welding. It is desirable but not necessary for an engineer to know how to weld. It is necessary for the technician to know technical and related information about welding, as well as to be able to do manipulative skills. It is unnecessary for the operator to know the technical aspects or the "why" of welding, although it would be desirable; however, he must be able to make satisfactory welds and pass certain tests.

3969. CHRISTIANSON, MAURICE JOHN. *A Study of the Supply and Demand of Automotive Technicians in the State of Michigan.* M.S. 1958, the University of Michigan, 55 p. School of Education L. (Ann Arbor)

Purpose of Study: To ascertain the status of the State of Michigan with respect to the schools supplying automotive technicians and the present demand for technicians.

Source of Data: School catalogs, the State department of public instruction, and responses from questionnaires sent to schools and 200 automotive service establishments in Michigan.

Findings and Conclusions: The schools in the State of Michigan train approximately 700 automotive technicians per year. Somewhat over one-half actually go into the trade. The training agencies are made up of 4 college-level programs, 1 trade school, and 13 day-trade, evening, or spare-time programs offered in the public schools. To maintain a satisfactory ratio of cars to mechanic (73 to 1) approximately 3 to 4 times as many students should be in training as are now enrolled in automotive programs. The responses from questionnaires sent to service establishments indicate that there now is a shortage of trained automotive technicians.

3970. CHRISTMAN, WEBSTER M. *A Study of Certain Administrative Features of Driver "Education" and "Training" Courses in High Schools of the United States in 1940.* M. Ed. 1940, The Pennsylvania State University, 113 p. L. (University Park)

Purpose of Study: To ascertain the status and practice of driver education and training and to provide information for school administrators interested in establishing driver training and education within their schools.

Source of Data: 173 questionnaires returned from driver training teachers or officials in 37 States.

Findings and Conclusions: High School driver education and training courses are being started in more places each year. Ten percent of the instructors teach the subject full time, and in most cases it is taught by the industrial arts and vocational education teachers. There are hundreds of trained teachers available for starting more of these high school driver education and training courses. Recommendations are given to help school administrators wishing to establish a driver education and training course in the high school.

3971. CLARK, ROBERT J. *Types of Home Repairs and Improvements Made by People Who Maintain a Home and the Factors Influencing the Selection, Use and Care of Tools and Equipment.* M. S. 1956, North Texas State College, 61 p. L. (Denton)

Purpose of Study: To ascertain the types of repairs and improvements made by homeowners themselves, to ascertain the most common types of tools and equipment purchased by homeowners, and to ascertain whether there is any relationship between the types of home repairs made by homeowners and previous experiences received in industrial arts courses.

Source of Data: Lumber yards, hardware stores, and paint and wallpaper stores located in Denton, Texas, and personal interviews with 100 homeowners who had made or were themselves making repairs and improvements to their homes.

Findings and Conclusions: The 100 homeowners possessed most of the common and basic tools, and some of them owned and used power equipment such as electric drills, saws, jointers, shapers, etc. The majority of the homeowners usually purchased well-known brands of tools and equipment and oftentimes relied upon the recommendation of a salesman as to the quality and type of tools and equipment needed. Most of the homeowners reported that they spent the greater part of their leisure or non-working time in making repairs and improvements on their homes. Previous experience acquired through taking courses in industrial arts, although of some value, did not necessarily stimulate them to become interested in making repairs and improvements.

3972. CLAUSEN, KENNETH ALLEN. *General Shop Planning.* M. A. 1959, University of Minesota, 152 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To investigate current opinions and ideas about the place of the general shop in the industrial arts curriculum, to establish criteria for planning an average general shop, and to develop a workable plan for general shop in light of above criteria.

Source of Data: Books, periodicals, studies, thesis, industrial literature and pamphlets applicable to industrial arts laboratory planning. Qualified persons associated with school building construction were interviewed.

Findings and Conclusions: Modern building construction permits shop arrangements that can be made to fit easily into new curriculum offerings in many combinations. The quality of a laboratory to offer experiences in up-to-date curriculums is limited mostly by the planning. Shop plans have been included in this study which could be incorporated in good existing shop space. The Minnseota plan for industrial arts teacher education and the integration of various subjects could be carried out in the shop plan given.

3973. CLAWSON, GEORGE R. *Survey of Personnel Practices in Selected Industrial Organizations of Utah.* M.S. 1954, Utah State University, 70 p. L. (Logan)*

Purpose of Study: To ascertain the factors responsible for the establishment of personnel functions, when these functions were introduced; and general conclusions regarding the factors affecting the origin of personnel functions in the State of Utah.

Source of Data: Personal interviews with personnel department officials of a selected list of industrial concerns, using an interview schedule, and examination of material found in libraries pertaining to the origin of personnel functions.

Findings and Conclusions: The conclusions drawn regarding the factors affecting the development of personnel programs were classified as controllable and uncontrollable factors. Some of the controllable factors were: Leadership among the companies, employer-employee relations, standards for personnel work, analysis of existing practices as a means of determining methods of improvement. Uncontrollable factors were: The times, in the sense of forces which occurred within a particular period and resulted in special emphases, community relations and relations with other companies, types of industry, and the fairly recent organization of formal personnel departments. In general, industries in Utah had a higher percentage of personnel practices than did industries in the United States as a whole. Among the personnel practices were: Merit rating plan, health and accident program, employee magazine, formal orientation program, employee handbook, service awards, and formal grievance procedure.

3974. **CLELLAND, WILLIAM HENRY.** *Development of a Bricklaying Curriculum for the Maryland State College in Princess Anne.* M.A. 1958, The Ohio State University, 191 p. L. (Columbus)

Purpose of Study: To ascertain the extent of trade and industrial programs in a select group of American colleges and on the basis of a critical analysis of these findings, to formulate an adequate program for the Maryland State College. The project was designed to present a contribution to education through a new study of bricklaying programs offered in a select group of small American colleges.

Source of Data and Method of Study: Historical studies were made of brickmaking and the bricklaying craft. Quotations from authorities in the field were quoted, and personal interpretations were made. Comparisons were made of various trade and industrial programs in bricklaying, and also a job and trade analysis of bricklaying.

Findings and Conclusions: An analysis of the data suggested that a revision of the trade and industrial program at the Maryland State College in necessary in order to improve its effectiveness in the preparation of young men to meet the challenge of the modern technological civilization.

3975. **COOK, JACK LOVELL.** *A Follow-Up Study of Albert Lea, Minnesota, High School Graduates* (Restricted to 1951–1956 Graduates Working in Albert Lea Industries). M. A. 1958, University of Minnesota, 187 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To evaluate the program of Albert Lea High School.

Source of Data: A questionnaire sent to Albert Lea graduates in local industry, and a similar questionnaire sent to their employers.

Findings and Conclusions: Five percent of the Albert Lea graduates remain in local industry; approximately 50 percent of them are classed as skilled. A need for further education in nearly all areas was recognized by employers and employees. Areas of special need in high school are penmanship, driver education, interest in industry, appreciation of good design and workmanship, economical use of materials, and safety. School counseling should be improved and contact maintained with graduates.

3976. **COOPER, FRED H.** *The Development of a Curriculum in Home Mechanics and Maintenance.* M. A. 1942, The University of Michigan, 61 p. L. (Ann Arbor)

Purposes of Study: (1) To ascertain what are the home activities in the area of industrial arts which eighth-grade girls of Kalamazoo are performing at home and with which they have difficulty and feel the need of further information; (2) To formulate a set of definite objectives based on a knowledge of the above findings which will determine the aims and methods of procedure, and (3) To outline a curriculum unit for eighth-grade girls in industrial arts classes.

Source of Data and Method of Study: A checklist of industrial arts activities encountered in the home was constructed and administered to eighth-grade girls enrolled in home economics.

Findings and Conclusions: From an analysis of the findings, a curriculum unit was developed for a 6-week period to include the items indicated most frequently on the checklist.

3977. **CORNFIELD, HOWARD R.** *An Annotated Index of School Shop Magazine Articles from September 1941 to June 1950.* M. Ed. 1957, Wayne State University, 61 p. Education L. (Detroit, Mich.)

Purpose of Study: To provide a suitable index for *School Shop* Magazine articles.

Source of Data and Method of Study: Data were secured through reviewing literature of similar studies, the selection of a preliminary indexing system, and the development of a permanent filing card system. The study was limited to articles which were not considered regular features of the magazine, such as editorials. Only those articles were included which appeared in the first 10 years of publication of *School Shop*.

Findings and Conclusions: Information from the preliminary indexing system was transferred to McBee Keysort Card KS–371B for the permanent filing card. The permanent file card index was placed in the John Trybom Memorial Library of the Department of Industrial Education, Wayne State University.

3978. COULAM, JOSEPH. *A Study of Formal Education Completed by the Building Trades Personnel of Vocational Region One.* M.S. 1955, Utah State University, 97 p. L. (Logan)*

Purposes of Study: (1) To compare the formal education possessed by the group personnel of the respective building trades of Utah Vocational Region One. (2) To provide basic background material for further studies relating to personnel in these trades.

Source of Data and Method of Study: Information concerning the formal education of tradesmen was gathered from records of the Industrial Commission Employment Security, Department of Employment. A questionnaire was developed and sent to tradesmen in the region. Personal visits were also made to tradesmen.

Findings and Conclusions: Very few skilled tradesmen entered their trade through an organized apprenticeship program. Less than 20 of the 606 men work for themselves or hire others. Special subjects studies by building trades personnel include algebra, chemistry, electricity, geometry, mechanical drawing, metalwork, physics, and woodwork. Cabinet and millmen show high percentages in all the subjects except electricity. No other group of tradesmen is as high. Electricians, heating and ventilating men, plasterers, plumbers, and sheetmetal workers reported that a high percentage of their high school graduates take special subject area classes.

3979. CROWLEY, ROBERT A. *Guidance Information for the Vocational Metalworking Program of Waterloo, Iowa.* M.A. 1958, University of Minnesota, 115 p. Department of Industrial Education (Minneapolis)

Purposes of Study: (1) To compile information about the metal machining, patternmaking, welding, metal fabricating, and foundry industries of the Waterloo, Iowa, area and the job opportunities they offer; and (2) to identify, through employers, the elements of the vocational-industrial education program that need improvement.

Source of Data: Interviews with officials of 60 metal shops and manufacturing plants.

Findings and Conclusions: The study provided a source of data for teachers, school administrators, and individuals interested in the nature of the metalworking industries and industrial workers in the Waterloo area. Its main value will be as source material for vocational guidance and for the teaching of related information in the vocational metalworking shops in Waterloo, Iowa.

3980. CUNNINGHAM, KARL E. *The Status of Applied Electricity in Selected Colleges and Secondary Schools in Kansas.* M.S. 1957, Kansas State Teachers College, 80 p. L. (Pittsburgh)

Purpose of Study: To ascertain whether existing programs of applied electricity in secondary schools and colleges are adequate, to stimulate some creative thinking, and to promote positive action in the direction of curriculum planning to include courses in applied electricity in schools where they are currently nonexistent.

Source of Data: The suggestions for improvement, change, and/or development were based upon objective data obtained from secondary school administrators, industrial arts supervisors, and instructors who taught applied electricity as a separate course or as a unit in a composite general shop. Additional information and statistics were derived from books, periodicals, published college catalogs, and documents prepared by the electrical industries.

Findings and Conclusions: Of the 88 high schools in the State, only 17.1 percent had a separate course or courses in applied electricity. Of this group, 47 percent indicated that they desired additional courses in electricity if facilities and curriculum could be adjusted.

Among the schools that did not have separate courses of applied electricity, 53.2 percent replied that they would like to have such a course.

Of the 11 teachers responding, 63.6 percent felt that their preparation as teachers of applied electricity had been inadequate.

About 70.6 percent of the supervisors and administrators who had separate courses of applied electricity indicated that such courses should be organized under the industrial arts department rather than the physical science department.

Most Kansas colleges do not have adequate offerings in electricity.

3981. DANIELS, GLENN HARVEY. *The Audio-Visual Programs of the University of Minnesota School of Agriculture.* M.A. 1958, University of Minnesota, 93 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To compare the audio-visual programs of the University of Minnesota schools of agriculture at Morris, Crookston, Grand Rapids and Waseca, Minnesota; and to compare the audiovisual programs of the University of Minnesota schools of agriculture with other schools throughout the Nation through a review of literature.

Source of Data: A review of literature, classroom teachers and administrators of the University of Minnesota schools of agriculture.

Findings and Conclusions: There is a favorable attitude toward audiovisual education in the schools of agriculture. Considerable effort is being made to instruct the faculty in the use of audiovisual equipment. More time from regular classroom activities must be allotted to the audiovisual coordinator. The audiovisual programs at the University schools of agriculture compare favorably with the programs of schools throughout the Nation.

3982. DEAFENBAUGH, ROBERT SYLVUS. *Fibrous Glass Reinforced Plastics.* M.A. 1956, The Ohio State University, 128 p. L. (Columbus)

Purpose of Study: To bring together information on fibrous glass reinforced plastics and to show possible applications to industrial arts education.

Source of Data: Books, periodicals, and literature from companies that produce fibrous glass reinforcement and mold finished products; also men in the industry.

Findings and Conclusions: The study of fibrous glass reinforced plastics should be included in the industrial arts program as an aid to the consumer in buying products and to the producer for future employees in the industry. It would be practical and possible to experiment with fibrous glass reinforced plastics in the industrial arts laboratory.

3983. DEAN, WINFIELD A. *A Survey of the Structure of the Industrial Arts Department Within the Division of Applied Arts and Sciences at Grossmont High School.* M.A. 1959, San Diego State College, 89 p. L. (San Diego, Calif.)

Purpose of Study: (1) To analyze the framework structure of the Industrial Arts Department, (2) to present the objectives of the various courses offered within the department, and (3) to show the relationship of the Industrial Arts Curriculum to the other departments in the Applied Arts and Science Division.

Source of Data: Books, bulletins, and other pertinent material.

Findings and Conclusions: In an effort to keep abreast of our changing society, the administration at Grossmont High School, in cooperation with faculty curriculum committees, has evaluated the various courses of study offered to the student and has modified subjects which needed to be changed, and added new courses to the Grossmont educational program. The administration established curricular studies in two basic areas: One for the college preparatory student, and the other for those students who end their education upon completion of high school.

3984. DE GRAVES, FRED JOHN. *A Follow-up Study of Shelby, Michigan High School Graduates for the Years 1951–1958, Inclusive.* M.A. 1959, Western Michigan University, 74 p. Waldo L. (Kalamazoo)

Purpose of Study: To evaluate the effectiveness of the curriculum in the Shelby, Michigan, High School for the years 1951 to 1958, inclusive.

Source of Data: A questionnaire to former graduates whose names and addresses were obtained from school personnel files.

Findings and Conclusions: The graduates engaged in higher education generally felt that the transition from their high school workload to their college workload was too great; they recommended that the college preparatory curriculum be strengthened. The business education graduates generally felt that the business education curriculum should be modernized with more office machines. The two major adjustment problems encountered by the graduates during the first 2 years after leaving high school were developing desirable study habits and making decisions. The study indicated that a satisfactory student-teacher relationship existed in the high school. Club activities benefited the girls more than the boys. Both boys and girls placed much importance upon their social life in high school.

3985. DELZELL, ATHOL HUGH. *Visual Teaching Aids for Industrial Arts Teachers.* M.S. 1960, Oregon State College, 106 p. Kerr L. (Corvallis)

Purpose of Study: To determine which aids are preferred and what visual materials and projection equipment are available for use in the industrial arts classes of the junior and senior high schools in the State of Washington.

Source of Data: A questionnaire survey of Washington State industrial arts teachers, letters to industries manufacturing tools and materials used in industrial arts shops, and letters to college film libraries of Washington, Idaho, and Oregon.

Findings and Conclusions: Many Washington industrial arts teachers are not making extensive use of available films due to lack of equipment for blocking out light in school shops. Field trips and resource persons are not used to advantage. The teacher demonstration is the most frequently used teaching aid, the chalkboard is second, and the motion picture is the third most frequently used. Instructors believe beginning industrial arts teachers should be trained in the use of visual aids. Students prefer animated films over stills. Projection equipment is accessible to most instructors. Much usable material is available from industry; a limited variety of film is obtainable from college film libraries.

3986. DICKEY, ROBERT CARL. *A Survey of Industrial Arts in the Secondary Schools in the State of Washington.* M. Ed. 1956, Western Washington College of Education, 94 p. Division of Graduate Studies (Bellingham)

Purposes of Study: To ascertain the type of organization characteristic of the industrial arts programs of the secondary schools of Washington; to ascertain the extent industrial arts is recognized as a necessary part of general education; to explore industrial arts teaching opportunities, shop facilities, and industrial arts teacher qualification; and to ascertain what suggestions industrial arts teachers and administrators have for the State of Washington's teacher training institutions that would enable them to produce better qualified industrial arts teachers.

Source of Data and Method of Study: Of 100 questionnaires sent to secondary schools, 75 were returned, representing 95 secondary schools in 27 counties of the State of Washington. Questionnaires were sent to 6 Washington teacher-training institutions; all were returned.

Findings and Conclusions: Industrial arts education has progressed in the secondary schools, and industrial arts education is a part of general education in the secondary schools in Washington. An existing shortage of industrial arts teachers in the State of Washington is likely to become more acute because of the growth in school population and the decline in the number of industrial arts teachers graduating. There has been a contest, however, for the more desirable industrial arts positions. Industrial arts teacher graduates should be prepared to teach classes in other fields of education besides industrial arts. The greatest number of future teachers will be needed in woods, metals, and crafts. The secondary schools are aware of the need for adequate industrial arts teaching facilities, and they are preparing to meet the need. A broad general knowledge of the field of industrial arts, experience in industrial work, and knowledge of shop practice are qualifications for successful industrial arts teachers. A need exists for the study and the improvement of the Washington teacher-training institutions and their industrial arts departments.

3987. DICKINSON, SHELDON L. *A Follow-Up Study of Utah State University Graduates in Industrial Arts Education, 1944 to 1957.* M.S. 1958, Utah State University, 88 p. L. (Logan)*

Purpose of Study: To evaluate the program of industrial arts training in terms of the needs of the graduates and to obtain suggestions for improvement of the program.

Source of Data: University records and a questionnaire which was developed and sent to all graduates qualifying for an industrial arts teaching certificate during a 14-year period.

Findings and Conclusions: The industrial arts program needs to be more widely advertised so that high school students may know more about the program and perhaps be guided into it. Graduates from the program at Utah State University have found employment in many occupations; they had no particular difficulty in adjusting to their positions. Most of the graduates, however, went into teaching, and more than 73 percent of them have stayed in the profession. With some modification the industrial arts program could serve an additional group who would fit into nonteaching positions.

3988. D'OVIDIO, ANTHONY A. *Shop Accident Liability Protection for Kansas Industrial Education Teachers.* M.S. 1954, Kansas State Teachers College, 101 p. L. (Emporia)

Purpose of Study: To determine whether Kansas industrial education teachers need liability insurance.

Source of Data: A questionnaire sent to 404 teachers selected at random from the Directory of Kansas Industrial Education Teachers for 1953.

Findings and Conclusions: Most Kansas industrial education teachers would find it difficult to defend themselves in a lawsuit for pupil injuries; hence, a good safety program is valuable as a means of defense in prosecution for pupil injuries. Liability insurance is a means of financial protection from liability for pupil injuries; however, insurance plans have limitations.

Kansas industrial education teachers agree that there is a need for liability insurance for pupil injuries. Only through State legislation can teachers be completely relieved from liability for pupil injuries.

3989. DOWLING, W. LESCHER. *An Approach to Some Problems of Teaching General Shop in Small High Schools.* M.A. 1959, San Diego State College, 135 p. L. (San Diego, Calif.)

Purpose of Study: To identify some of the advantages and disadvantages of the small high school and suggest methods of making use of the advantages and overcoming the disadvantages; point out some problems and their solutions as encountered by the beginning general shop teacher in the small high school; and describe the physical setting and program requirements of a good high school general shop.

Source of Data: Books, publications of the government and of learned societies and other organizations.

Findings and Conclusions: The small high school had many problems in the form of finances, size, leadership, improperly prepared teachers, and outmoded or poorly planned curriculum. At the same time, the small high school offered many opportunities for the new teacher in the way of closer community, staff, and student contacts and a chance to present a more meaningful experience for the students. The general shop teacher in the small high school worked in an area readily accepted by the students and through the assets of the small high school could develop this experience effectively.

3990. DRAKE, LAWRENCE COLEMAN. *Tripoli and Its Uses.* M.S. 1959, Kansas State College of Pittsburg, 57 p. Porter L. (Pittsburg)

Purpose of Study: To present the formation, history, mining, preparations, properties, health aspects and uses of tripoli with particular interest given to the Missouri-Oklahoma mineral.

Source of Data: Periodicals, brochures, books, government publications, interviews, and newspapers.

Findings and Conclusions: Tripoli is applicable for many industrial processes. Experimentation is being carried on to investigate further applications. The Missouri-Oklahoma area is the predominant producer of tripoli.

3991. DUFFY, VERNELL F. *A Follow-Up Study of the Graduates of the Vocational Department of Pontiac High School, 1951–1955.* M. Ed. 1957, Wayne State University, 33 p. Education L. (Detroit, Mich.)

Purpose of Study: To obtain from the graduates of the Vocational Department of the Pontiac High School an appraisal of the curriculum they had followed in high school in relation to their present occupation.

Source of Data: A checklist completed by the vocational graduates of Pontiac High School from 1951 to 1955.

Findings and Conclusions: The graduates expressed a need for additional related technical information; increased placement activities, particularly for automotives majors; more practical English and a greater stress on descriptive geometry in drafting. Findings revealed a need for a separate curriculum combining trade training with pre-engineering; a review of the course content, equipment and facilities of the electrical curriculum; and more vocational guidance.

3992. DULL, GEORGE A. *Selected Shop-Tested Junior High General Metal Projects in the San Diego City Schools.* M.A. 1959, San Diego State College, 125 p. L. (San Diego, Calif.)

Purpose of Study: To select shop-tested junior high general metal projects based upon specific criteria for project evaluation.

Source of Data: Books and manuals of industrial education and a survey of shop-tested projects in nine schools.

Findings and Conclusions: Six criteria were used as a basis for the selection of shop-tested general metals projects. These criteria were applied to projects from selected schools, and 30 projects were judged to be meeting these standards.

3993. EASON, OSCAR. *A Reorganization of the Automotive Science Department of Prairie View A and M College.* M.S. 1957, Prairie View A and M College, 113 p. L. (Prairie View, Texas)

Purpose of Study: To ascertain the present status of and the possible need for the reorganization of the automotive science department at Prairie View A and M College.

Source of Data: Literature in the field of automotive science, responses to questionnaires, interviews with persons directly working in the automobile industry, an appraisal of the catalogs and bulletins of various schools of higher education, and letters from authorities in the automotive industry.

Findings and Conclusions: The study revealed that the automotive science program at Prairie View A and M College was adequate in terms of objectives, student services, instructional program, instructional materials, staff, and finance. The major reorganizational need was in the area of physical facilities and equipment.

3994. EASTMAN, REX D. *Prepared Kits in the Industrial Arts Program of the Utah Secondary Schools.* M.S. 1959, Utah State University, 64 p. L. (Logan)

Purpose of Study: To ascertain the extent ready-prepared kits are being used in industrial arts, in which subject areas they are most widely used, their effect upon the basic learning units or objectives involved in the different fields of industrial arts, and the trend in industrial arts toward or away from the use of these kits.

Source of Data: 240 questionnaires sent to the junior and senior high school industrial arts instructors in the State.

Findings and Conclusions: Prepared kits are being used by about 40 percent of industrial arts teachers in Utah. Kits are not being used to the same degree in all subject areas; leatherwork was the subject area in which the greatest number of teachers indicated kit usage and also the area listed as best suited for the use of kits. The users of kits, as a whole, believe that kits are helpful in accomplishing or meeting some of the objectives of industrial arts. The nonkit users expressed the opinion that kits help very little or have no bearing on meeting most of the objectives.

There appears to be an increasing trend in the use of kits in the subject areas of leatherwork and woodwork. Instructors of the other areas in which kits were used indicated a small increase—except for radio—but not enough to show a definite trend; the decrease in radio was too small to indicate a trend. The number of years of teaching experience seems to have little effect on the use of kits in industrial arts. The remarks of a number of the respondents seemed to indicate that the size of class might influence the teacher's decision as to the use of kits in certain subjects. In large classes the teacher's work load, in reference to supplying students with working materials, may be lightened by the use of kits.

3995. ECHELBARGER, ROBERT VERN. *Applications of Eighth Grade Mathematics to the Ninth Grade General Shop Program in Iowa.* M.A. 1958, Iowa State Teachers College, 118 p. L. (Cedar Falls)

Purpose of Study: To identify those applications of eighth-grade mathematical concepts in relation to technical drawing, woodworking, metalworking, and electricity.

Source of Data: Textbooks and personal interviews. Textbooks were reviewed for related mathematical content, and sample problems were selected on the basis of eighth-grade mathematics content.

Findings and Conclusions: A working knowledge of eighth-grade mathematics on the part of the student is necessary in a sound industrial arts program. Mathematical concepts that are applied within each given activity area vary from textbook to textbook. The mathematical concepts presented in the eighth-grade program not only deal with a subject in its theoretical considerations but have applications for practical situations as well. There appears to be a need for the general shop program in Iowa to become more uniform throughout the State.

3996. EDGEL, WILLIS JOHN. *Course of Study in Industrial Arts Adult Education With Special Reference to Upholstery.* M.S. 1958, Utah State University, 209 p. L. (Logan)*

Purpose of Study: To ascertain what courses are most popular in adult industrial arts education programs currently being conducted. To present a suggested course of study in adult industrial arts education.

Source of Data: Questionnaires mailed to the industrial arts teachers in the State of Utah.

Findings and Conclusions: The study indicated there was considerable interest in industrial arts programs among adults in the State of Utah. This was substantiated by the 28 organized programs currently in operation, the 17 programs recently completed, and the programs offered in connection with the colleges and other organizations throughout the State.

It was apparent that there is a need over the State for more leadership and organization in the field of adult education, and for instruction in the fields of interest. The study showed that upholstery was one of the popular industrial arts activities for adults; therefore, a proposed course of study in upholstery is presented, based upon a careful analysis of literature pertaining to the various phases of upholstery.

3997. EHRENBORG, JOHN DAVID. *Selected Problems Involved in Establishing an Automotive Mechanics Program in the San Diego City Schools System.* M.A. 1957, San Diego State College, 127 p. L. (San Diego, Calif.)

Purpose of Study: To prepare a list of problems besetting the teacher in the opening of a new automotive mechanics shop, to enumerate some possible solutions to these problems, and to offer a suggested procedure for the rest of the school year in an automotive mechanics shop in the San Diego Unified School District.

Source of Data: Publications of the government and of learned societies and other pertinent literature in the field.

Findings and Conclusions: A relationship appears to exist between general education and industrial arts automotive mechanics. It was found that the preschool period was one of the most essential in the organization of the program. The physical plant appeared to be the determining factor in the type of program conducted. The procedures and activities of the district and of the particular school and rapport with the school personnel were discovered to be important.

3998. EKONG, EOEM UDO. *A Study of the History and Administration of Vocational Education in the United States as a Possible Basis for Establishing Vocational Education in Nigeria.* M.A. 1957, University of Washington, 216 p. L. (Seattle)

Purpose of Study: To discover how American experiences might help Nigeria in establishing vocational education.

Source of Data and Method of Study: Vocational education literature, journals, U.S. industrial history, and documentary records pertaining to the problem. The historical method of study was used.

Findings and Conclusions: In the United States vocational education started when the need for skilled labor resulting from the industrial revolution made such education mandatory. Since Nigeria is embarking on an industrialization period, she should begin at once to establish vocational schools. Nigeria should follow the example of the United States and make her vocational education programs federal rather than local or regional.

3999. ELFERT, DONALD LEE. *Industrial Education in the Colleges and Universities of Louisiana.* M.S. 1959, Northwestern State College, 98 p. Russell L. (Natchitoches, La.)

Purpose of Study: To present a picture of the programs of industrial education in the colleges and universities of Louisiana; staffs, offerings, physical facilities, functions, and activities.

Source of Data: College catalogs, bulletins, interviews, correspondence, questionnaires, and pertinent literature.

Findings and Conclusions: Eight of the 22 institutions of higher learning in the State of Louisiana have programs of industrial education. The phases of industrial education which are offered include industrial arts education, industrial technology, vocational-industrial education, technical industrial arts, and manual arts therapy. Forty-seven persons are employed on industrial education staffs in the colleges and universities of Louisiana. Teaching experience, industrial experience, and professional preparation vary considerably. Departments of industrial education are keeping up with modern trends and developments in education and industry in regard to facilities and educational offerings. Each department has some type of placement service for students and graduates. Practices regarding transfer of courses and credits are not uniform.

4000. ELLER, CHARLES MANNING. *A Follow-Up Study of the Semi-Professional Engineering Graduates of Arlington State College.* M.S. 1957, North Texas State College, 90 p. L. (Denton)

Purpose of Study: To obtain and analyze data received from graduates of the Department of Semi-Professional Engineering at Arlington State College relative to the effectiveness of the training given by the college in assisting in choosing an occupation, developing skills, and forming attitudes necessary in the procurement of an occupation.

Source of Data: The offices of the registrar and the Department of Engineering at Arlington State College; questionnaires returned from graduates of the Department of Semi-Professional Engineering at Arlington State College; and professional literature.

Findings and Conclusions: A majority of the graduates expressed a need for broader knowledge of semi-professional engineering. More instruction in electricity, mathematics, electronics, and English should be made available to all semi-professional engineers. A large percentage of the graduates attended some college after graduating from Arlington State College.

4001. ESKELSON, ROSS W. *A Comparison of Over-Snow Vehicles Produced at Utah State Agricultural College.* M.S. 1955, Utah State University, 157 p. L. (Logan)*

Purpose of Study: To compile a historical project record of over-snow vehicle research done at Utah State Agricultural College from 1939 to 1954, to make a comparative analysis of the vehicle produced by these research projects, and to relate what has been done in the field of over-snow transport at Utah State Agricultural College to that done by other selected agencies during the same period.

Source of Data: Field diaries of project leaders, periodic reports of agencies concerned, and personal interviews with various project leaders during periods of development.

Findings and Conclusions: It is not practical to design one type of machine to meet the many varied snow and climatic conditions. Vehicles for arctic areas need to be heavier, the amphibious type being recommended. Vehicles should be light for soft snow of intermountain areas. Overall vehicle weight should not exceed six-tenths of a pound per square inch of trails area. Tracks should be relatively long in proportion to their width, to lessen rolling resistance in deep snow. Failure to produce a satisfactory snowmobile has been due to failure to recognize the varied kinds of vehicles needed and to meet the difficult conditions. A definite need exists for a coordinating agency to produce a commercially practical snowmobile. The Utah Scientific Research Foundation is gradually becoming the coordinating agency.

4002. ESPLIN, WENDELL LUKE. *Follow-Up Study of the Terminal Graduates of Weber College.* M.S. 1952, Utah State University, 101 p. L. (Logan)*

Purposes of Study: (1) To ascertain how effectively Weber College terminal graduates have been trained to qualify for the industrial or commercial world, by determining the occupational status and adjustment of these graduates; (2) To ascertain the social adjustments these graduates have made for general living; and (3) To evaluate the Weber College course of study taken by the terminal graduates.

Source of Data: A questionnaire mailed to the graduates.

Findings and Conclusions: Data are given on the employment and the marital and social status of the graduate. The program of vocational terminal education at Weber College was evaluated and the need for further training indicated.

4003. FLUG, EUGENE ROY FRANK. *Change as a Process in Industrial Arts Teacher Education in a Changing World.* M.A. 1959, University of Minnesota, 199 p. Department of Industrial Education (Minneapolis)

Purposes of Study: To formulate a philosophy based upon the *process* of change; to identify some characteristics needed by industrial arts teachers facing an ever changing world; to develop course activities designed to encourage the development of these needed characteristics in students studying to become industrial arts teachers.

Source of Data and Method of Study: Data were secured from a review of the literature to ascertain prevailing technological and social conditions, from which implications were drawn for teacher education. These implications formed the basis for a statement of the writer's teaching philosophy. Characteristics needed by industrial arts teachers were formulated in terms of this philosophy and expressed in the form of aims for a college class in craftwork.

Findings and Conclusions: The process of change was of considerable importance to industrial arts teachers and should be seriously considered in their college preparation. The furtherance of a teaching viewpoint can be accomplished to a considerable degree in one quarter through the appropriate use of teaching activities.

College students can act as teachers in the classroom and effectively direct the activities of other students without sacrificing the quality of the learning.

Students will accept the challenge of self-direction if opportunities are properly provided and if the purposes of their activities are closely related to their goals as future teachers. Self-teaching may be used effectively as a means of extending the scope of shop courses in the preparation of industrial arts teachers. College students oriented toward teaching will accept and look for evaluation of their efforts by their fellow students.

The use of independent study and experimentation within a class can do much to encourage student efforts beyond minimum course requirements. Evaluation by students of their own shop projects may better serve to indicate the depth of their understanding than an instructor's evaluation of those same projects. Students' competition for grades represented one of the greatest impediments to the development of cooperation in the classroom.

4004. FOLSOM, DONOVAN CHESTER. *The Construction of Diagnostic Tests for Use in a General Shop Situation.* M.A. 1959, University of Minnesota, 134 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To construct a first-form diagnostic test to be used in a general shop situation for identifying a student's familiarity with terminology important to the industrial arts areas of foundry, machine shop, sheet metal, and welding.

Source of Data and Method of Study: A survey of the appropriate literature was made to provide background material. The validation of materials used for this study was accomplished by conferring with industrial arts and vocational instructors in the Minneapolis metropolitan and suburban areas. As a result of the information gathered, two first-form diagnostic tests were constructed.

Findings and Conclusions: It was concluded that because this study was limited to the foundry, machine shop, sheet metal, and welding areas of the industrial arts program, these tests might be used as a diagnostic instrument in a comprehensive unit shop in the metals area. The tests might also be used as an achievement instrument to measure, on a verbal scale, a student's expanded familiarity with the terminology used in the industrial arts areas covered in this study.

4005. FORD, HILARY BLANTON. *Interpreting Industrial Arts in the School-Community.* M.S. 1956, North Texas State College, 79 p. L. (Denton)

Purpose of Study: To ascertain current practices used to interpret industrial arts as a phase of the curriculum to the school community in 125 schools in Texas.

Source of Data: Literature concerned with school interpretation and a questionnaire.

Findings and Conclusions: A majority of the schools studied utilized less than 60 percent of the recommended practices for furthering school-community relations. Sixty-two percent of the industrial arts teachers involved reported that they had radio and television stations in the community in which they taught; 25 percent of these same instructors sponsored programs designed to interpret industrial arts to the community through these mediums. Home visits were made by only 45 percent of the industrial arts teachers, and only 15 percent of the teachers utilized personnel from industry located in the community to interpret the community to the school. Ninety-two percent of the teachers involved exhibited their students' work at some time during the school year.

4006. FRANKLIN, ESTOL PAUL. *Accidents and Their Causes in Selected Industrial Arts Shops of Southeast Iowa.* M.A. 1959, Northeast Missouri State Teachers College, 51 p. L. (Kirksville)

Purpose of Study: To investigate types of accidents, causes, methods of recording, and safety practices carried on in school shops of southeast Iowa.

Source of Data: A questionnaire sent to the high schools of southeast Iowa with enrollments under 500.

Findings and Conclusions: Accidents occurred in about one-half of the shops in southeast Iowa, the most common being cuts and lacerations of the finger, hand, and thumb. Carelessness on the part of the student was reported to be a major cause of shop accidents. The wood chisel from the hand tool group and the circular saw from the power tool group were involved in the greatest number of accidents. Not all shops had fire-fighting equipment. Most of the schools in this area had first aid equipment and made use of accident records.

4007. FREDAL, FRANCIS J. *An Annotated Index of School Shop Magazine Articles From September 1950 to June 1956.* M. Ed. 1958, Wayne State University, 56 p. Education L. (Detroit, Mich.)

Purpose of Study: To provide a complete index of school shop magazine articles.

Source of Data and Method of Study: Articles were indexed under selected major subject classifications briefly describing the contents of the articles and recording the author, volume, and page numbers of the articles. In addition, the volume and page numbers of projects in each major area were included. Similar studies were reviewed, and a preliminary indexing system was selected. Upon completion of this preliminary indexing system, the information was transferred to the permanent filing cards.

Findings and Conclusions: The permanent file card index is now located in the Trybom Memorial Library of the Department of Industrial Education, Wayne State University.

4008. FREITAG, ARNOLD JURDEN. *Industrial Arts in Selected Reorganized Secondary Schools in Iowa.* M.S. 1957, Iowa State College, 47 p. L. (Ames)

Purpose of Study: To examine the changes in industrial arts programs in secondary schools that were combined after district reorganization.

Source of Data: Personal conferences with the superintendents or the industrial arts instructors of selected schools. A checklist was developed to evaluate the schools selected.

Findings and Conclusions: There was found to be considerable expansion of facilities. The courses most frequently added were auto mechanics, drafting, and welding. Separate shops were provided for farm shop and industrial arts in the older facilities, whereas plans were being made for both to be taught in the same shop in new facilities. No plans were being made to offer vocational training.

4009. FRICKER, ROBERT W. *Wrought Iron in the Industrial Arts Curriculum.* M.A. 1954, The Ohio State University, 96 p. L. (Columbus)

Purpose of Study: To assemble material concerning wrought iron which can be used by students in industrial arts.

Source of Data: An examination of available literature dealing with processes and related materials, personal interviews with professional wrought iron tradesmen and production workers, trips through various wrought iron manufacturing establishments, and experimental activities in developing and finishing wrought iron projects in a high school metal shop.

Findings and Conclusions: The writer concludes that wrought iron work is an important industrial process and should be included in the industrial curriculum. The necessary equipment and materials are available in most school shops or may be obtained at little cost.

4010. FRIE, GEORGE O'DELL, Jr. *Applications of the Silk Screen Process to Industrial Arts in Elementary Education.* M.S. 1956, Oregon State College, 58 p. L. (Corvallis)

Purpose of Study: To suggest practical applications of the silk screen process to industrial arts in the eighth grade and below; to show that the quality of the projects will be improved; to show how general education aims will be furthered by this application.

Source of Data: Industrial Arts and Vocational Education magazine, *School Arts* magazine, books on the silk screen process, and other miscellaneous sources. The suggestions made in the thesis were tried with seventh- and eighth-grade groups.

Findings and Conclusions: The use of the silk screen process did improve the quality of the projects and is practical for the students. Teacher training institutions should acquaint students with the possibilities of the process in a methods class and if possible actually make use of it in a demonstration project.

4011. GALLOWAY, GEORGE. *The Effect of the Industrial Arts Curriculum on the Leisure Time Activities of the Retired Teacher in Utah.* M.S. 1954, Utah State University, 87 p. L. (Logan)*

Purpose of Study: To ascertain whether the leisure time activities of retired Utah teachers have been in some way affected by the industrial arts program. To determine whether the social adjustments in the retired status were influenced by the number of skills and interests those teachers had developed earlier in life.

Source of Data: Questionnaires to the retired teachers of Utah. Out of 587 sent out, 320 were returned; 300 were used in compiling data for the study.

Findings and Conclusions: The study showed that America is rapidly becoming a country of older people, many of whom will be confronted with the problem of adjustment upon retirement. The success and happiness of retired teachers will depend upon the skills and interests the individuals have developed in their process of maturation. It appears that the arts and crafts used by the large majority of retired teachers were taught at an early age in the school. From all the information on the arts, crafts, and hobbies of the questionnaire returns, there is a strong indication that the curriculum of industrial arts has had an extensive effect on the leisure time of the retired teacher.

4012. GEHRES, FLOYD P. *Development of a Handbook for Diversified Cooperative Training, Trade and Industrial Vocational Education in the State of Ohio.* M.A. 1958, The Ohio State University, 118 p. Educational L. (Columbus)

Purpose of Study: To identify the information teacher-coordinators of the State of Ohio, desired in a handbook designed to help initiate, operate, and improve a program of diversified cooperative training.

Source of Data: A questionnaire, devised with information obtained from diversified cooperative training handbooks from 11 States, and a 30-question checklist pertaining to problems of diversified cooperative training were submitted to Ohio diversified cooperative training teacher-coordinators.

Findings and Conclusions: Findings show that a handbook which is precise but not lengthy is urgently needed and should include: The nature of a D.C.T. program, organization and operation, instructional activities, coordination, public relations, professional improvement, records, advisory committees, student clubs, and adult vocational classes. Findings were used to prepare such a handbook.

4013. GERBER, RUSSELL L. *Woodwork Project Index.* M.A. 1957, University of Minnesota, 59 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To provide a list of projects and a course of project plans for the novice, teacher, or journeyman.

Source of Data: The *Cumulative Book Index,* 1938–1953, and the *Trade List Annual,* 1953.

Findings and Conclusions: A list of projects, and sources of project plans are recommended.

4014. GIERKE, EARL WILLIAM. *A Study of the Mathematics Used by Mechanical Draftsmen in Industries in the Minneapolis-St. Paul Area.* M.A. 1959, University of Minnesota, 171 p. Department of Industrial Education (Minneapolis)

Purposes of Study: To obtain the judgments of drafting supervisors as to the relative frequencies with which their mechanical draftsmen used 69 basic elements of mathematics selected from algebra, plane and solid geometry, advanced algebra, trigonometry, analytic geometry, and basic calculus. Also, to ascertain the relative frequency with which these elements were used by supervisors, designers, checkers, by detail and layout draftsmen, and by those in industries employing less than 100 people and in industries employing more than 100 people.

Source of Data and Method of Study: Elements of mathematics were determined from curriculums used in high schools and colleges in the area studied. Industries were selected from the Minnesota Directory of Manufacturers. Supervisors in these industries were determined and selected through stratified random sample of all industries employing mechanical draftsmen. All supervisors in the sample were personally contacted and asked to respond to a questionnaire relative to the study. A response was obtained from 96 percent of the sample.

Findings and Conclusions: Based on the response of drafting supervisors in 48 industries it was found that: (1) Most draftsmen used a major portion of the subject matter contained in elementary algebra, plane and solid geometry. More than half of the elements of advanced algebra and trigonometry were not used. Most draftsmen never used the elements of analytic geometry and calculus. (2) Drafting supervisors, designers, and checkers used 45 of the 69 elements of mathematics with a greater frequency and used 24 of the elements with the same frequency as detail and layout draftsmen. The later group of draftsmen never used 30 of the more advanced elements. (3) Draftsmen in industries employing more than 100 people used more of the elements of mathematics and used them more frequently than did draftsmen in industries employing less than 100 people. In all sizes of industries the more advanced elements of mathematics were used infrequently or not at all.

4015. GLENN, HAROLD T. *An Analysis of Safety Education in Industry and School Shops, With Specific Recommendations for Auto Shop.* M.A. 1953, University of California at Los Angeles, 131 p. L. (Los Angeles)

Purpose of Study: To adapt industrial safety practices to the needs of secondary schools and to present a detailed approach to safety education for automotive classes.

Source of Data: Pertinent literature in the field. The materials on safety education were compiled and analyzed for application to secondary school industrial classes. Practices were related to education objectives, administrative organization, and techniques found to be effective in industry and schools.

Findings and Conclusions: A summary of six approaches to safety education are presented—logical, proficiency, honor, fear, positive, specific—with the relative merit of each. A suggested program of safety education for the auto shop is presented which contains a self-administered workbook, assignment sheet, review, and lesson plans.

4016. GLISMANN, LEONARD W. *A Study of the Craft Activities in Summer Recreation Programs in Relationship to Weber County, Utah.* M.S. 1952, Utah State University, 95 p. L. (Logan)*

Purpose of Study: To stimulate craft programs for individuals in their own recreational activities, and for groups in summer programs and other forms of recreation.

Source of Data: Recreation centers throughout the United States where handicrafts were being taught. An endeavor was made to reveal the scope of the handicraft program on a national basis. The part which adults, teens, nine- to twelve-year-olds, and six- to eight-year-olds had in recreational handicraft was a criterion.

Findings and Conclusions: The study represents the thinking of leaders from 46 States. Since the beginning of recreation in 1885 there has been continuous advancement toward public support for recreation. The swing from private to community support by local taxation has significance. Information reveals that a 10-week program is most common. Class periods vary from 30 minutes to 6 hours, with an average of 2 hours for crafts classes. School buildings and outdoor playgrounds serve best. Teachers are chosen from trained playground leaders, industrial arts teachers, handicraft instructors, or willing adults who volunteer their services. These craft programs can be a medium for enriching and broadening the field of industrial arts.

4017. GOLLER, PAUL McDANIEL. *A Study of Lapidary—A Resource Unit in Industrial Arts.* M. Ed. 1953, University of Washington, 77 p. L. (Seattle)

Purpose of Study: To develop a practical and usable resource unit on lapidary from which definite units might be developed for use in the industrial arts classes of the senior high school.

Source of Data: Literature in the fields of education and lapidary, a survey of gem cutting in the public high schools of the three Pacific Coast States, and a series of experiments in the conversion of common woodworking equipment to lapidary uses.

Findings and Conclusions: Few high schools have introduced lapidary into any portion of the curriculum. Recently numerous developments in gem cutting have made such inclusion possible. Gem cutting has many worthwhile educational possibilities in the development of skills and knowledge leading to vocational and avocational interests, to creative developments in appreciation and craftsmanship, and to the motivation of allied fields of learning. Gem cutting need not be an expensive course, as the existing equipment of the industrial arts classroom is adaptable to the work of the lapidary.

4018. GORDON, ROBERT ALLEN. *An Investigation of the Performance of Five Polyvinyl-Resin Type Glues Under Simulated Service Conditions.* M.A. 1957, University of Minnesota, 72 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To investigate the relative strengths of various brands of polyvinyl-emulsion base glues under service type conditions such as heat, dilution, and exposure to moisture.

Source of Data: Four sample hard-maple blocks were used in the experiment in each of five separate tests using five randomly selected brands of polyvinyl-emulsion base glue.

Findings and Conclusions: Some differences appeared to exist among the five brands of the polyvinyl-emulsion base glues tested. Some glues appeared to resist heat better than others, and several brands appeared to gain strength when subjected to moisture and allowed to dry and also when diluted with 1 part of water to 8 parts of glue. Since all the tests were conducted with hard-maple blocks it would appear evident that some of the glues would give better results if thinned slightly before using them on hard or dense woods.

4019. GRAVES, THEODORE GEORGE. *Field Practices as Basis for Evaluating and Improving a College-Level Air-Conditioning - Drafting Course.* M.S. 1957, Oregon State College, 102 p. L. (Corvallis)

Purpose of Study: To develop criteria that could be used to evaluate and improve a college-level air-conditioning drafting course.

Source of Data: Personal interviews in selected air-conditioning and refrigeration firms in Los Angeles.

Findings and Conclusions: Greater weight should be given to standard and common field and area practices. Many occasional and infrequent practices are essential in the individual firms concerned. Practices with broad general concepts should be used as instructional vehicles. A degree of standardization of drafting practices has taken place. A few practices have become obsolete. The comprehension of control circuits is beyond most freshmen. Sketching ability is highly desirable.

4020. GREGORY, FRANCIS JOSEPH. *A Survey to Determine the Scope of Industrial Arts Offerings in the Seventh and Eighth Grades of Selected School Districts in Multnomah County, Oregon.* M. Ed. 1959, University of Washington, 59 p. L. (Seattle)

Purpose of Study: To obtain information and data which would be helpful in organizing and improving industrial arts courses in the elementary schools of selected districts in Multnomah County, Oregon.

Source of Data: Questionnaires, a checklist, and personal interviews. The administrators of the selected schools were asked questions pertaining to school policy and administration, while all other questions were directed to the industrial arts instructors. Pertinent observations were made during a personal tour of the shops.

Findings and Conclusions: The scope of industrial arts in the elementary schools varies to the extent that the elementary students entering the same high school always have an uneven background. A new Oregon law on unification of school districts under one administrative unit will have a profound effect upon the curriculum offered in the future by the county schools.

Further study should be made in the following areas where the industrial arts program is weak, according to accepted standards: Training of instructors, safety of students, facilities, and fields of exploration. These factors are affected by educational philosophy and trends, and therefore improvements may be slow in developing.

4021. GROSSMAN, GEORGE CHARLES. *A Study of the Utilization of Equipment in Industrial Arts Woodworking Shops in Selected Public High Schools of the State of Washington.* M. Ed. 1959, University of Washington, 75 p. L. (Seattle)

Purpose of Study: To ascertain the use given the various tools and pieces of equipment available in industrial arts woodworking shops in selected public high schools of the State of Washington.

Source of Data: A questionnaire sent to 200 industrial arts woodworking teachers. From the 177 returned, the number and relative utilization of the various tools and pieces of equipment were tabulated according to the size of the classes using the shop.

Findings and Conclusions: Most woodworking shops lack space and/or equipment, a fact which limits the effectiveness of the shop program. The table saw is the piece of equipment that most often causes congestion. Most shop instructors are able to secure the hand tools they consider desirable but have trouble obtaining major pieces of equipment, particularly planers.

Of the relatively new woodworking tools available, the radial arm and sabre saws are receiving acceptance in the school shop but the electric hand saw is not, mainly because of the safety factor.

The problem of space could be partially eliminated in many shops by switching from 1- and 2-place benches to 4-place benches.

4022. GRUNLOH, RUDOLPH A. ***The St. Paul Vocational Evening School Trade and Industrial Program from 1945 to 1957.*** **M.A. 1958, University of Minnesota, 117 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To provide information about the development, student body, scope, housing facilities, instructors, and administrative staff, financing, equipment, working relationships, and the educational services of the St. Paul Vocational Evening School trade and industrial program.

Source of Data and Method of Study: A combination of descriptive and historical methods of analysis was employed in studying the files of the St. Paul public schools, the State division of vocational education and the U.S. Veterans Administration. Faculty, administrative staff, advisory committees, and apprenticeship committees were interviewed, and minutes of joint apprenticeship committees and advisory committee meetings were examined. Government publications and school bulletins were studied for authentic information, together with textbooks dealing with research and vocational education.

Findings and Conclusions: The study revealed that the St. Paul Vocational Evening School trade and industrial program has, during the period from 1945 to 1957, provided a dynamic, flexible program of training with the assistance and advice of the members of more than 50 apprenticeship committees and advisory committees.

4023. HAGEY, JAMES THEODORE. ***Factors of Selective Admission to Industrial Arts Teacher Education.*** **M.A. 1956, The Ohio State University, 98 p. L. (Columbus)**

Purpose of Study: To identify some factors which are of the greatest importance in the selection of industrial arts teachers and to describe present programs of selection. To recommend a program of selection for applicants to industrial arts teacher education programs.

Source of Data and Method of Study: Literature was reviewed to discover present thought on this subject; a questionnaire was sent to heads of departments, supervisors, and chairmen of industrial arts programs at colleges in the selected States; recommendations and conclusions were drawn from these questionnaires.

Findings and Conclusions: A recommended program of selection would include specific standards for admission based on the following items:

1. Epilepsy
2. Heart disease
3. Contagious disease
4. Impediment of speech
5. Mathematics
6. Uncorrected hearing
7. Reading
8. Uncorrected vision
9. Writing
10. Diabetes
11. Kuder Preference
12. No work experience
13. History of poor health
14. Flat feet
15. Strong vocational interest blank
16. Varicose veins
17. Personal history
18. Color blindness
19. Loss of a limb.

4024. HAILES, CHARLES W. ***Industrial Arts in Utah—Its Introduction and Development.*** **M.S. 1953, Utah State University, 110 p. L. (Logan)***

Purposes of Study: To identify the more important policies and practices from the period of the introduction of industrial arts to 1952 within the State of Utah. To encourage professional educators to improve their understanding of the industrial arts program in Utah. To assemble evidence showing the effects of the industrial arts program. To assemble pertinent information regarding the development of industrial arts.

Source of Data: Material found in the office of the State Superintendent of Public Instruction, board of education offices in counties throughout the State of Utah, and records in universities and colleges in the State. Personal contact was made with leading educators.

Findings and Conclusions: Utah first established a manual training school in 1902 in Salt Lake City; the results were so satisfactory that strong public sentiment favored its permanent establishment. Because of the success of the schools in Salt Lake City, other areas of the State established manual training programs during the next few years. By the summer of 1920 the program had spread to most of the State and by 1952 all but one school district listed industrial arts as part of the regular school curriculum.

4025. HALE, MAURICE JESSE. ***Improving Industrial Arts Through Growth in Human Relations.*** **M.A. 1957, University of Minnesota, 73 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To investigate the teacher-pupil aspect of human relations in three secondary schools in Norfolk, Virginia.

Source of Data: Questionnaires completed by students and teachers.

Findings and Conclusions: The personal liking of a student for his teacher is one of the most powerful factors in bringing about an effective learning relationship between the teacher and pupil. It was recommended that teachers be made aware of the influence of personal relationships in successful learning experiences and that their efforts be directed toward patterns of successful teacher-pupil relationships.

4026. HAMARI, ROY M. ***A Teaching Guide and Instructional Materials for a College Course in Integrated Handwork for Elementary Schools.*** **M.A. 1958, University of Minnesota, 243 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To develop a teaching guide with coordinated instructional materials for a course in handwork for elementary teachers in training.

Source of Data: Conclusion and recommendations reported in a doctoral dissertation by Robert Dean Brown, entitled "Industrial Arts Competencies Needed by Elementary Teachers." Correlated instructional materials were used in a classroom situation and revised on the basis of student questionnaires and, in the case of tests, item analyses.

Findings and Conclusions: The questionnaires completed by the students pertaining to the instructional materials indicated that these materials in their final form were satisfactory for classroom use.

4027. HAMMANS, WALTER RICHARD. ***Entrance Age and Achievement of Non-Veterans at Iowa State University.*** **M.S. 1959, Iowa State University, 22 p. L. (Ames)**

Purpose of Study: To investigate the relationship between entrance age and academic achievement of male nonveterans at Iowa State University.

Source of Data and Method of Study: The group selected to be studied was a sample of 350 male nonveterans who were freshmen at Iowa State beginning the winter quarter, 1943, and who had either graduated, dropped from college, or transferred to another institution on or before the summer session of 1953. They had no other college experience. Statistical measures used in the treatment of the data were analysis of linear regression and analysis of quadratic regression.

Findings and Conclusions: The statistically nonsignificant coefficient of correlation found for the quadratic regression curve and the nonsignificant F-value obtained from analyzing differences in achievement at the various age levels indicated that there is no relationship between age and achievement of nonveterans attending Iowa State University.

4028. HAMMOND, HOWARD RAY. ***Professional Attitudes and Interests of Iowa Industrial Arts Teachers.*** **M.S. 1956, Iowa State College, 47 p. L. (Ames)***

Purpose of Study: To ascertain the degree of satisfaction of Iowa industrial arts teachers with the professional teachers organizations and with the teaching profession.

Source of Data: A questionnaire to the industrial arts teachers of Iowa.

Findings and Conclusions: About 50 percent of the teachers belonged to the National Education Association; nearly 95 percent belonged to the Iowa State Education Association. The Iowa Industrial Education Association membership was 120, and the membership of the Iowa Industrial Arts Association was 77. Nine percent were dissatisfied with the NEA, and 24 percent were dissatisfied with the ISEA. Sixty-five percent of the teachers were satisfied with teaching; 19.8 percent were not satisfied with teaching.

4029. HANSON, DOUGLAS A. ***Driver Education in the Minneapolis Public Schools.*** **M.A. 1959, University of Minnesota, 106 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To ascertain the need for driver education, review and describe programs of driver education, and set forth details of the organization and operation of the driver education program in Minneapolis.

Source of Data: Current literature, including magazines, pamphlets, and periodicals in which driver-education programs were reported. Files and records of the Minneapolis program were examined.

Findings and Conclusions: The Minneapolis driver-education program was designed around the needs of the city and could serve as a model for the development of similar programs.

4030. HANSON, WILLIAM ELMER. *An Evaluation of the Industrial Arts Program of Clarion, Iowa, High School.* M.S. 1957, Iowa State College, 47 p. L. (Ames)

Purpose of Study: To ascertain whether there were implications for a revision of the industrial arts curriculum in Clarion High School, to find out whether the needs of the graduates of industrial arts have been met, and to ascertain the principal weaknesses of the high school industrial arts courses.

Source of Data: A questionnaire sent to the male graduates. The graduates rated industrial arts courses as to value in their present occupation, in hobbies, and in home repair.

Findings and Conclusions: Mechanical drawing, hand and machine woodworking, welding, and machine shop were reported to be of most value to their present occupation. It was indicated that additional courses in electricity, motor mechanics, photography, and carpentry would have been of much value.

4031. HARDING, LEWIS. *The Professional Preparation and Teaching Assignments of Industrial Arts Teachers in Utah, 1948–49.* M.S. 1949, Utah State University, 80 p. L. (Logan)*

Purposes of Study: To determine what the certification requirements should be for the industrial arts teachers of Utah. To ascertain the qualifications of these teachers in respect to present certification requirements and the standards which might be established from the first purpose. To discover the probable causes of weaknesses in the training of industrial arts teachers and recommend procedures whereby such weaknesses might be strengthened.

Source of Data: Letters to leaders in industrial education throughout the country to establish the criteria by which Utah teachers were to be judged; also, a questionnaire to the industrial arts teachers of Utah.

Findings and Conclusions: The present general secondary requirements in the field of professional education seem to be satisfactory. The study showed that the requirements for the industrial arts certificate should be raised in order for teachers to be fully qualified in certain fields of instruction which they are attempting to teach, such as drawing and electricity. The industrial arts teachers of Utah were shown to be a homogeneous group who qualified in varying degrees for the jobs which they occupied in the secondary schools of the State. The "average" industrial arts teacher was shown to teach industrial arts subjects to about 99 students per year in classes which had an average of 22 students; he had had nearly 12 years of teaching experience and had taught industrial arts subjects nearly all of these years; he had had an average of a little over 5 years of experience in a trade connected with industrial arts subjects. The average teacher's age was between 30 and 35.

4032. HARTZELL, MARTIN A. *Interests and Factors Involved in Choosing an Occupation.* M.S., 1933, The Pennsylvania State University, 54 p. L. (University Park)

Purpose of Study: To attempt to discover the nature and origin of the interests and other factors which influence a person in the choice of any particular occupation.

Source of Data: The Strong Vocational Interest Blank and a supplementary list of questions were given to each of 434 freshmen and seniors in Pennsylvania State College courses in commerce and finance, liberal arts, dairy husbandry, chemical engineering, civil engineering, industrial engineering, mechanical engineering, mining engineering, and electrochemical engineering.

Findings and Conclusions: The nature and origin of factors and interest which influence the choice of an occupation are difficult to determine. A great percentage of the students chose an occupation because they thought that they would enjoy it. If an occupation is disliked it is usually considered difficult.

4033. HARWOOD, CHARLES EDWARD. *A Handbook of Selected Teaching Methods.* M.A. 1957, University of Minnesota, 62 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To provide a handbook of selected teaching methods in a concise form that would be easy to use.

Source of Data: A survey of the appropriate literature on methods.

Findings and Conclusions: The handbook provides a ready source of ideas for the instructor who is interested in varying his teaching method.

4034. **HATALSAN, JOHN W.** *A Status Survey of Apprenticeship in San Diego, California.* M.A. 1953, San Diego State College, 128 p. L. (San Diego, Calif.)

Purposes of Study: To develop and organize data concerning apprentice characteristics, apprenticeship program operations and functions, variations in apprenticeship standards between crafts, and data concerning status of the labor supply in apprenticeship. It is also desired to establish the means by which apprentices enter apprenticeship training and the material and information which assisted the apprentices in deciding to enter apprenticeship training.

Source of Data: A questionnaire from selected apprenticeship programs in San Diego, California.

Findings and Conclusions: Individual summaries, made for each craft or program surveyed, present a complete picture of the characteristics of apprentices training in the particular craft. Number, percent, and means tabulations are included where applicable.

4035. **HAWKS, CHARLES M.** *A Study to Determine the Content of an Industrial Arts Program in the Elementary Schools of Box Elder County.* M. S. 1954, Utah State University, 52 p. L. (Logan)*

Purpose of Study: To provide a suggested list of activities which can be used in carrying out a more desirable program in industrial arts in the elementary schools of Box Elder County, Utah.

Source of Data and Methods of Study: The first step was to search through available materials to prepare a list of aims and objectives of education, both in general and in industrial arts education. The second step was a study of child needs as they relate to contributions of industrial arts. Third was to send a questionnaire to parents in rural communities throughout the county.

Findings and Conclusions: The information gathered in this study indicates there is a place in the general elementary school curriculum for the phases of industrial arts applicable to both boys and girls which lead toward the development of a good wholesome understanding and appreciation of the materials and processes of industry. The activities to be used in an industrial arts program in the elementary schools should be chosen wisely and be determined by a pattern of sound and timely experiences. Formal work with elaborate tools and equipment should be avoided.

Industrial arts should be an integral part of the curriculum activities of the upper elementary schools of Box Elder County and should be taught by the regular classroom teacher. The activities in industrial arts should be correlated with other classroom activities. Teachers should take advantage of any local facilities which might contribute toward a better understanding of industry and industrial life. An adequate program for industrial arts should begin with the needs and interests of the child and his society and should recognize individual differences in such a relationship.

4036. **HAYNER, JOHN BROOKS.** *Individual Instruction Sheets in Industrial Arts—Their Value and Extent of Usage.* M.S. 1958, Oregon State College, 96 p. L. (Corvallis)

Purposes of Study: To ascertain the extent to which industrial arts instructors are using individual instruction sheets; learn whether they aid in the problem of individual instruction; ascertain whether instruction sheets are of value to the students and whether there is a significant difference in the extent of their use in various sections of the United States.

Source of Data: Information forms sent to industrial arts instructors in 26 selected States and controlled experimental research conducted under actual teaching conditions in an industrial arts shop.

Findings and Conclusions: Seventy-six percent of the industrial arts instructors contacted *use* instruction sheets; geographical location is *not* a factor in their use. Teacher-prepared instruction sheets are the most popular type; information sheets are the most commonly used style. Ninety-two percent of the respondents believe students *use* instruction sheets to advantage. Effective integration of itinerant students is simplified through the use of instruction sheets. Discipline problems show a marked decrease when instruction sheets are properly employed. Higher academic achievement and neater, more accurate projects result from use of instruction sheets. Instruction sheets *do* allow extra time for individual assistance, but *not* for maintenance work or teacher preparation.

4037. **HAYNES, WALTER.** *A Study of the Extent to Which Girls Were Included in Industrial Arts in Grades Seven Through Twelve in the State of Iowa.* M. Ed. 1958, Iowa State Teachers College, 98 p. L. (Cedar Falls)

Purpose of Study: To ascertain the extent to which girls were included in industrial arts in grades seven through twelve in the State of Iowa, and the opinions, accomplishments, and methods of implementation of such programs.

Source of Data: Questionnaires sent to a sampling of schools in Iowa, and literature pertinent to the subjects.

Findings and Conclusions: Only 16 percent of programs in the State were coeducational. Eighty percent of the respondents felt that girls should be offered industrial arts; most felt that girls should be in separate classes. Lack of facilities is a large factor in deterring girls from industrial arts. Programs for girls do not utilize enough home mechanics, metalworking, jewelry, and tool instruction. A 55-minute period was favored. Project selection was most often required. One-half the instructors use tests; one-fourth use none. The trend is toward including more girls in industrial arts programs.

4038. **HEIDENBERGER, DONALD GEORGE.** *A Survey of Educational Qualifications of Male Shop Teachers in Technical Vocational High Schools.* M.A. 1959, The University of Michigan, 45 p. School of Education L. (Ann Arbor)

Purpose of Study: To ascertain the educational qualifications of male industrial teachers in technical vocational high schools and the relationship to other professional academic teachers.

Source of Data: A check-list type of questionnaire sent to four schools of each State or territory offering all-day trade and vocational-industrial programs.

Findings and Conclusions: The study revealed that 94 percent of all male shop teachers have been certified to teach. Of all the teachers reporting, 23 percent had bachelor's degrees, 12 percent had master's degrees, while 21 percent had no educational training under the Vocational Education Acts. Fifty-nine percent of the men with bachelor's degrees were working toward a master's degree; less than 25 percent of the men were working toward a bachelor's degree. The main reasons for employment in the technical-vocational area were the desire to teach and to obtain certification by the State board of education.

4039. **HELGESON, ROBERT STANLEY.** *A Study of the Organization and Administration of Stagecraft in the First-class High Schools in the State of Washington.* M. Ed. 1958, University of Washington, 72 p. L. (Seattle)

Purpose of Study: To find what kinds of stagecraft organizations, facilities, and operational problems existed in the first-class high schools in the State of Washington, and to gain information through which stagecraft programs may be improved.

Source of Data and Method of Study: The normative survey method was used. Data were obtained through the aid of a 5-page questionnaire sent to all 48 first-class high schools in the State.

Findings and Conclusions: The findings show that: 66.6 percent of the schools offered stagecraft as a class; 59.2 percent of the money for stagecraft came from the student body and 27.7 percent from the school district; 75 percent of the stagecraft teachers received salary adjustments above the salary schedule for stagecraft work; and 60 percent of the stagecraft teachers had some training in stagecraft, 52 percent in industrial arts, and 53 percent in drama and play direction. Prospective teachers of industrial arts, speech, and drama should be informed of the possibility of teaching stagecraft, and correspondence and night classes should be provided.

4040. **HESCH, EARL RAYMOND.** *Correlation of Mechanical Drawing and Industrial Arts Shop Courses in the High Schools of New Mexico.* M.S. 1956, Oklahoma State University, 100 p. L. (Stillwater)

Purpose of Study: To ascertain the extent to which mechanical drawing is being correlated with shop courses in high schools in New Mexico.

Source of Data: The New Mexico State Department of Education, a questionnaire sent to the drawing instructors in New Mexico high schools, and library materials.

Findings and Conclusions: The dominant source of drawing is the traditional textbook method. The least-used method is that of originating drawing problems from the shop projects. The general shop is believed to be a rich source of drawing problems due to its varied areas of instruction. Most of the drawing teachers believe drawing can be correlated with all or most of the industrial arts shop courses and that this correlation would be of considerable value. Suggested methods of attaining or improving correlation include: Offering drawing in the junior high schools, making drawing a corequisite or prerequisite to shop courses, expanding the present general shop programs to include drawing and more varied experiences, and further recognizing the problem.

4041. **HILL, DAVID E.** *A Study of the Possible Contributions Offered by Industrial Arts Activities in the Prevention of Juvenile Delinquency.* M.S. 1959, Kansas State Teachers College of Emporia, 80 p. White L. (Emporia)

Purpose of Study: To determine the possible contributions of industrial arts and related activities, as offered through the schools and social agencies, toward the prevention of juvenile delinquency.

Source of Data: (1) Case records of 200 recorded official male delinquents filed in the Jackson County, Mo., Juvenile Court during 1956; (2) results of 394 questionnaires of 3 selected high schools (selected according to student delinquency count) in Kansas City, Mo., and (3) social agencies located in Kansas City, Mo.

Findings and Conclusions: Most boys have acquired experiences in industrial arts through the schools, and this type of activity is pursued by many boys in hobbies and leisure-time activities. Although the actual effectiveness of this type of activity in delinquency prevention is not known, there is a sufficient number of children interested in industrial arts to warrant the inclusion of these activities in programs offered by the schools and social agencies.

4042. HILL, HAROLD D. *A Survey of Day Trade Preparatory and Evening Training in the Duluth Area, 1948–1958 With Projection of Training Needs to 1970.* M.A. 1959, University of Minnesota, 92 p. L. (Duluth)

Purpose of Study: To provide information which may be used in planning educational services for trade preparatory and trade extension training in connection with the Duluth Public Schools.

Source of Data: Personal contacts with employers, employees, officials of labor organizations, the local office of the Minnesota Employment Service and the Duluth Chamber of Commerce; also a summary of records of the industrial commission of Minnesota (for indentured apprentices), health and welfare records (for ages of workers), statistical records of the Board of Education (for graduates), and other literature pertinent to the study.

Findings and Conclusions: There should be an increase in the opportunities for training in: (1) Day trade-preparatory classes, such as carpentry, electricity, printing, and drafting; (2) technical training, such as industrial electronics, specialized drafting, inspection, testing, and engineering techniques: (3) inservice training on an extension basis for apprentices and other employed workers. Provision should be made to provide appropriate counseling and guidance in order to effectively meet personal, social, and occupational needs.

4043. HILSGEN, JAMES EDMUND. *An Investigation of Electrochemical Processes Applicable to the Secondary School Shop.* M.A. 1959, University of Minnesota, 94 p. Department of Industrial Education. (Minneapolis)

Purpose of Study: To investigate industrial electrochemical processes for the purpose of adapting them to industrial arts situations.

Source of Data and Method of Study: A review of electrochemical literature and visits to selected industries served as the basis for the study. Experiments with the various processes were conducted. The processes were evaluated in terms of safety, complexity, equipment and materials required, and pupil needs. Selected industrial arts objectives were then characterized in terms of a unit on electrochemistry.

Findings and Conclusions: The study showed that it is possible to conduct certain electrochemical processes in a school shop. In present industrial arts curriculums only one process is generally covered, i.e., cells and batteries. A unit on electrochemistry would facilitate the attainment of industrial arts objectives in a manner not now generally used.

More research should be conducted on electrochemical unit organization, projects for electrochemistry, and integration of industrial arts and other school subjects.

4044. HOAGLAND, DONALD P. *The Effect of Intelligence, Arithmetic Ability and Age on the Success of Students in Shop Subjects.* M.A. 1959, Montclair State College, 82 p. L. (Upper Montclair, N.J.)

Purpose of Study: To ascertain the relationship between the success of students in a manipulative-type shop subject and their: (1) IQ, as represented by a standardized test score, (2) basic arithmetic ability, as represented by a percentile score on a standardized test, and (3) chronological age.

Source of Data and Method of Study: A group of 133 tenth-year students enrolled in the beginning wood shop course during the school years from September 1955 through June 1958. The appropriate data were obtained from records at the high school. Statistical methods were used to compute medians, means, standard deviations, coefficients of correlation, and standard errors of estimate.

Findings and Conclusions: Findings were consistent and showed that neither intelligence, arithmetic ability, nor age has any precise or definite effect upon success in a shop-type subject.

4045. HOEYE, WYMAN, DELOS. *Individual Machine Workstations for Machine Woodwork.* M.S. 1958, Oregon State College, 87 p. L. (Corvallis)

Purpose of Study: To find if there is any educational advantage in using combination woodworking machines as individual workstations.

Source of Data: A 2-year experimental study using one of two advanced classes in woodwork as the *experimental* group (each student assigned a combination machine to use alone), and the other class as the *control* group (machines used more on the conventional pattern of unit machines).

Findings and Conclusions: The experimental students were found to have changed machine setups an average of 44.2 times, while the average control student used single-unit machines 58 times. Average time per experimental student for machine changes was 42 minutes per year as compared to average "waiting" time per control student of 115.5 minutes per year. A difference in average comprehensive test scores of 7.03 was found in favor of the experimental student, while a difference of average IQ scores of 5.3 existed in favor of the experimental group. There may be some educational advantage to be derived from use of the individual machine workstation that utilizes a combination machine assigned to a given pupil during his work period.

4046. HOFFERT, VICTOR F. ***Enrichment of the Architectural Drafting Program at Herbert Hoover Senior High School.*** **M.A. 1959, San Diego State College, 144 p. L. (San Diego, Calif.)**

Purpose of Study: To investigate the possible uses and values of selected visual aids as they may be made to apply in the architectural drafting program.

Source of Data: Textbooks and periodicals.

Findings and Conclusions: Many three-dimensional aids are not available to schools because of the prohibitive cost, which of necessity would have to be paid for their construction. For this reason, the instructor will find it necessary to construct the majority of these types of aids.

The possibilities of enriching experiences in the classroom situation are limited only by the initiative and careful planning by the instructor.

4047. HOHMANN, CARL JUNIOR. ***An Investigation of the Possibilities of Small Internal Combustion Engines in Industrial Arts Shops.*** **M.S. 1957, Kansas States Teachers College, 72 p. L. (Pittsburg)**

Purpose of Study: To analyze the possibilities of the small gasoline engine in the industrial arts program.

Source of Data: Books and manufacturer's manuals to obtain historical and technical information; information concerning the possibilities of small gasoline engines in industrial arts shops was obtained by means of an information form sent to selected industrial supervisors and automobile mechanics.

Findings and Conclusions: Small gas-engine work is being taught in some schools. The opinions of the respondents indicated favorable possibilities for the use of these engines, particularly as an area in composite general shops or as a unit of work in automobile mechanics. The increasing use of these small engines merits some attention.

4048. HONN, MAX L. ***The Nature of and Need for Vocational Education in McLean County, Illinois.*** **M.S. 1950, The Pennsylvania State University, 82 p. L. (University Park)**

Purpose of Study: To determine: (1) How well the secondary schools of the county prepare their graduates and 11- and 12-grade dropouts for the occupations they enter; (2) how well the types of training offered in the secondary schools correspond with the opportunities for employment; and (3) what vocational education, if any, should be established to the mutual benefit of both prospective and on-the-job workers and the employing agencies of the county.

Source of Data and Method of Study: Three surveys were made. A school survey was made by personal interviews to determine course offerings of the secondary schools, occupations followed by the graduates and 11- and 12-grade dropouts, and vocational training available to prospective and on-the-job workers from sources other than the secondary schools. An industrial survey to determine the type and amount of vocational education which might be needed by the various establishments and businesses of the county was conducted along the lines suggested by the American Vocational Association. The third survey used to obtain data was one of related research.

Findings and Conclusions: Conclusions of the study are presented in tabular and statistical form. From the data obtained and conclusions drawn recommendations are made with the intention of bringing about a better balance between the training offered by the schools and the training necessary to take advantage of the opportunities for employment offered by the industries of the county.

4049. HOOK, JOHN STUYVESANT. ***Problems Encountered in Organizing a New Industrial Arts General Metalworking Shop.*** **M.A. 1957, San Diego State College, 106 p. L. (San Diego, Calif.)**

Purpose of Study: To present problems common to the organization of new industrial arts shops and peculiar to the organization and operation of a new general metalworking shop.

Source of Data: Books, government publications, learned societies, and other literature pertinent to the study.

Findings and Conclusions: An instructor's methods of approach and solutions for these problems have been presented. Topics treated in the study were: The objectives and course of instruction, preparatory activities, beginning the school year, the programs in full operation, and ending the school year.

4050. HORNIG, THOMAS B. ***A Study of the Handcraft Experiences of the Pre-High School Students of Oregon.*** **M.S. 1955, Utah State University, 62 p. L. (Logan)***

Purpose of Study: To ascertain the kind and amount of handcraft instruction given to seventh- and eighth-grade students in Oregon.

Source of Data: Questionnaires sent to representative schools of junior high level and to elementary schools employing more than three teachers.

Findings and Conclusions: Both industrial arts teachers and arts and crafts teachers teach handcraft activities, although each group teaches it differently. Administrators tend to schedule more time for handcrafts when it is taught by specially prepared teachers. Large schools have a broader program than small schools. Lack of equipment is one of the greatest obstacles in teaching handcrafts. The number and kind of activities varied greatly in the different schools; 10 was the average number taught.

4051. HORTON, GEORGE RICHARD. ***Industrial Arts in a Consolidated School System.*** **M.A. 1956, The Ohio State University, 105 p. L. (Columbus)**

Purpose of Study: To record the evolution of industrial arts at the Liberty Union Local School District and to examine the status and problems of the program.

Source of Data and Method of Study: Library and documentary research used to describe the setting, derive the position of industrial arts, and outline the subject. Observations and participation formed a basis for describing the status of the program and influencing some of the projections. Philosophical methods were used to project the program.

Findings and Conclusions: The community resources of the school district were not utilized to the extent they could be, and more attention should be given to them if the objectives determined in the study are to be attained. Local support indicates that similar programs would be successful in consolidated schools of Delaware County and elsewhere. The present offerings in industrial arts have inadequate equipment, space, and staff to meet the enrollment expected in 1957–58. An interpretation of the nature of industrial arts in American schools and some recommendations for developing a comprehensive industrial arts curriculum at Liberty Union Local School District were included.

4052. HOWE, TREVOR GENE. ***Predicting Success in the Aviation Core Area at Des Moines Technical High School.*** **M.S. 1958, Iowa State College, 36 p. L. (Ames)**

Purpose of Study: To determine the predictive value of various measures in the aviation core area at Des Moines Technical High School.

Source of Data and Method of Study: The permanent records in the graduate and drop-files were thoroughly checked for gathering data. The criterian used in predicting success was high school graduation. The various measures used as variables were: (1) The American Council on Education psychological examination, (2) the Bennett Test of Mechanical Comprehension Text score, (3) the revised Minnesota Paper Form Board Test score, and (4) the final grade of the 10–B trade and industrial orientation course.

Findings and Conclusions: A coefficient of correlation was obtained by first computing a point biserial coefficient of correlation and adjusting the value obtained by a correction factor. It was found that the value for the variable representing the final grade received in the 10–B trade and industrial orientation course exceeded the value necessary for significance at the 1-percent level. The other variables were not significant at the 5-percent level.

The discriminant equation with six variables was used and solved by substituting the correct values into the simultaneous equation. A multiple-point biserial coefficient of correlation yielded a coefficient of 0.3368. Considering the percent of contribution of each of the variables, further analyses and testing for significance left only the final grade received in the trade and industrial orientation course as a predictor.

4053. HUFFMAN, FLOYD RENALDO. ***A Historical Study of the Industrial Arts Teacher Clubs in Minnesota.*** **M.A. 1958, University of Minnesota, 125 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To record the history and the character of the inservice teachers industrial arts clubs in Minnesota.

Source of Data: Memory of the "old-timers" who have been staunch supporters of the clubs over the years and existing records in each of the clubs in the State.

Findings and Conclusions: The clubs have served as a medium through which industrial arts teachers have been able to improve themselves professionally and improve industrial arts in the schools in general on a statewide level. The *esprit de corps* of industrial arts teachers has been maintained over the years by teacher participation in club activities. Energetic and wise leadership at both the local and the State levels has been important in the development and progress of the club movement.

4054. **HURT, RONALD E.** *The History and Development of Modern Furniture Design in Industrial Arts.* M.A. 1957, San Diego State College, 100 p. L. (San Diego, Calif.)

Purpose of Study: The study concerns the application of good design principles in industrial arts, a historical review of design in furniture, and the development of design through each succeeding culture.

Source of Data: Books, government publications, learned societies, periodcals, and encyclopedia articles.

Findings and Conclusions: Modern educators in industrial arts recognize the need of design training. Much has been written on the subject; a majority of the writers have stressed the importance of understanding the history of early design in order to teach the subject.

4055. **HUTCHINGS, GILBERT RUSSELL.** *The Need for Adequate Finishing Facilities in the Modern High School.* M.A. 1955, The University of Michigan, 35 p. L. (Ann Arbor)

Purpose of Study: To ascertain what facilities are now in use and what facilities are generally recommended for an ideal woodshop finishing room.

Source of Data: A questionnaire sent to industrial arts and vocational education shops in Michigan.

Findings and Conclusions: Fifteen major recommendations were selected, on the basis of those most often made, after giving consideration to teacher experience, school enrollment, and other facilities of the school shop.

4056. **IMM, ROBERT OTTO.** *An Investigative Study of Manual Arts Therapy.* M.A. 1958. University of Minnesota, 124 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To provide occupational information on manual arts therapy.

Source of Data: The literature of authorities in the field of occupational information and vocational guidance. From this basic research an outline of occupational information was formulated and a study was conducted in general rehabilitation and manual arts therapy to establish a consensus to formulate an inclusive occupational brief.

Findings and Conclusions: In the majority of texts there was agreement on the formulation of an occupational brief. The following information about an occupation was deemed necessary: Its history; its importance in relation to society; the number of workers engaged in it; the need for workers and their duties, qualifications, and preparation; the method of entering the occupation, length of time before skill is attained, and probable advancement and earnings; related occupations. There was also general agreement that: The sequence of topics is optional, some topics have little or no significance to some occupations, and the study may begin with a historical approach or a definition approach. From the research in general rehabilitation and manual arts therapy the following conclusions were drawn: Manual arts therapy is an integral part of the rehabilitation process; under one name or another, this therapy has been used for centuries; it is a limited profession; there are opportunities in the field; industrial education graduates may qualify; opportunities for advancement are limited; and the field has a favorable outlook if recognized by the American Medical Association.

4057. **JACOBSEN, EARL DUANE.** *An Introduction to Design for the Leather Worker.* M.A. 1957, University of Minnesota, 77 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To study the principles of design in the field of leather carving, to clarify methods of ornamentation, and to develop various component parts of a design.

Source of Data: The literature on the principles of design.

Findings and Conclusions: A unit of design and a method of ornamentation were developed.

4058. **JACQUES, RICHARD IRWIN.** *The Basis for the Establishment of a Teacher Education Program of Offset Printing at the Kansas State Teachers College of Pittsburg.* M.S. 1958, Kansas State College of Pittsburg, 95 p. Porter L. (Pittsburg)

Purpose of Study: To determine whether a need exists for offset printing in the printing division at Kansas State Teachers College, Pittsburg.

Source of Data: High school printing departments in Arkansas, Kansas, Missouri, and Oklahoma and printing departments in teacher education institutions of the United States.

Findings and Conclusions: Offset printing is taught in many high schools by teachers having had little or no college training in offset. It was found that Kansas State Teachers College is far behind other colleges in this area and that a need for offset printing does exist. The offering should include six courses with 15 semester hours of credit.

4059. JARRETT, RAY J. ***Custodial Service Responsibilities as Affecting Industrial Arts Facilities.*** **M.S. 1958, Utah State University, 90 p. L. (Logan)***

Purpose of Study: To ascertain the duties of the teacher, students, and custodian with respect to housekeeping in industrial arts shops.

Source of Data and Method of Study: Superintendents and industrial arts teachers of each school district in Utah were sent a questionnaire to obtain a list of custodial duties and to ascertain district policies pertaining to the assignment of responsibility for these duties. Department heads of industrial education on the university level were sent questionnaires soliciting their opinion on the problems involved.

Finding and Conclusions: Statements made by heads of industrial education departments show a definite division of custodial responsibilities between building custodians and students. Great disparity existed between what superintendents stated was school policy and what actually was being done. The custodian should have the major responsibility of cleaning and dusting; the students, through a definite plan, should be responsible for maintaining a neat and orderly shop.

4060. JAY, DeWAYNE D. ***A Measurement of Attitude of Elementary School Teachers Toward a Program of Industrial Arts in the Elementary School.*** **M.S. 1952, Utah State University, 67 p. L. (Logan)***

Purposes of Study: To ascertain which objectives of education in the elementary school were receiving major emphasis. To build an attitude scale which would measure the attitudes of teachers toward industrial arts in the elementary school.

Source of Data and Method of Study: Writing in the field. The attitude scale was prepared using a somewhat modified form of the Thurstone technique, and the scale was administered to 92 elementary school teachers in the Cache County School District, Utah.

Findings and Conclusions: The teachers included in this study believe that industrial arts would have real value in being able to enrich the elementary program of their school district. Industrial arts should be made available to both boys and girls working together, and the program should be more concerned with creative expression than with developing manual skill. Industrial arts can do a great deal in meeting special needs and can contribute strongly to the social objectives of the elementary school. From industrial arts the elementary school child can gain a fairly good background for understanding his cultural and industrial environment; field trips are helpful in this. Teachers in the primary grades believe that industrial arts adds more to the elementary program than do the teachers of the intermdiate grade levels.

4061. JEDLUND, HAROLD GRANT. ***A Course in Art Crafts—A Guide Book for Teaching a Ninth Grade Course in Art Crafts at Edison High School, Minneapolis, Minnesota.*** **M.A. 1956, University of Minnesota, 98 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To develop a teaching guide for a course in art crafts at Edison High School, Minneapolis, Minnesota.

Source of Data: A review of the literature in art crafts, student records at Edison High School, and a questionnaire completed by the students.

Findings and Conclusions: Students enrolled in art crafts have many problems. Methods are suggested through which an instructor can help students cope with their problems.

4062. JENKINS, CHARLES DUANE. ***Industrial Arts Subject Areas for the Secondary Schools as Listed in State Level Publications as of June 1957.*** **M.S. 1957, Oklahoma State University, 39 p. L. (Stillwater)**

Purpose of Study: To ascertain which States had published industrial arts instructional materials; to learn what subject areas were being stressed in the industrial arts programs of each State; to ascertain the type of industrial arts shop that was emphasized by each State.

Source of Data: A comprehensive and concentrated examination of industrial arts instructional materials.

Findings and Conclusions: A majority of the 27 States which published industrial arts materials included a wide range of subject areas in their publications. These areas formed the core of a comprehensive industrial arts curriculum which may contribute to the realization of the broad goals of general education. Although the subject areas listed in the published materials were of such a nature as to be used in either the unit or the general shop, the general shop was prevalent in the majority of the States.

4063. **JENSEN, MILTON HANS.** *Individual Instruction Sheet Workbook for Use in Seventh Grade General Shop—The Construction of a Set of Activity Assignment Sheets.* M.A. 1956, University of Minnesota, 187 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To develop an individual activity assignment sheet workbook to help the instructor cope with individual differences, to meet the goals set forth, and to meet the standards for a State-approved industrial arts department.

Source of Data and Method of Study: Literature on individual activity assignment sheets. Twenty-one activity assignment sheets were constructed with introduction, references, directions for completion, illustrations, cartoons, tests, and grade sheets. Student reactions to the study were observed.

Findings and Conclusions: Students generally favored the use of the sheets, although there is need for further investigation with varied groups. The sheets proved to be especially helpful to the instructor in providing multiple activities in his shop.

4064. **JOHNSON, DELTON LEE.** *A Survey of the Scope of Industrial Arts in Small Kansas High Schools.* M.S. 1958, Kansas State Teachers College, 147 p. William Allen White Memorial L. (Emporia)

Purpose of Study: To investigate the scope of industrial arts in small Kansas high schools.

Source of Data: Questionnaires were sent to 109 industrial arts teachers in Kansas high schools having an enrollment of 65 or fewer students during the 1957–58 school term. These teachers had previously indicated their willingness to complete a questionnaire; 104, or 95.4 percent of the 109 questionnaires were returned.

Findings and Conclusions: There is a trend toward the general shop type of organization, which is considered most adaptable to the small high school. Specialized industrial arts training for certification is inadequate; it should be raised to 24 hours, now common for other subjects in class "A" schools. A course of study for industrial arts distributed by the State would be helpful. A well-trained State supervisor would be of great benefit to teachers of industrial arts in the small schools. Farm shops should be included in industrial arts programs in these schools to help meet the needs of rural communities. Teachers should teach more related information, make use of a good textbook, and establish and make use of shop library facilities. Small high school industrial arts programs should be examined and revised to better meet modern general education objectives.

4065. **JOHNSON, GORDON EDWARD.** *Junior High Industrial Arts Safety Test.* M.S. 1957, Iowa State College, 45 p. L. (Ames)

Purpose of Study: To devise an instrument for use in junior high industrial arts to help in the teaching of shop safety.

Source of Data: Data were secured by reviewing previous work in shop safety; by giving the finished test to a group of students; and by obtaining the opinions and ideas from junior high industrial arts instructors of Iowa.

Findings and Conclusions: A test was constructed and given to a number of students in selected Iowa schools. The coefficient of correlation between the odd and even items was found to be 0.816. This test points to areas of shop safety which should have more emphasis in the junior high industrial arts program.

4066. **JOHNSON, ROBERT J.** *The Printing Notebook in a Beginning Graphic Arts Course.* M.S. 1957, Kansas State Teachers College, 55 p. L. (Pittsburg)

Purpose of Study: To develop a device by which a student could collect and store technical information permanently and efficiently.

Source of Data: Information forms sent to printing instructors and students. Interviews with graphic arts instructors, and an investigation of records of past use of the notebook.

Findings and Conclusions: A notebook was developed which met with the approval of most of the printing instructors. A suggested outline for the notebook was developed, also an explanation of its various functions and recommendations for its use.

4067. **JOHNSON, ROBERT SEVERT.** *Techniques of Working Stainless Steel in Secondary School Metal Shop.* M.S. 1959, Oregon State College, 32 p. Kerr L. (Corvallis)

Purpose of Study: To determine in an experimental way whether industry techniques for working stainless steel can be adapted to the limited facilities of secondary school industrial arts metal shop.

Source of Data: Manuals and booklets from steel companies; experimentation in the school shop with these as a guide.

Findings and Conclusions: Industry techniques for working stainless steel can be adapted to the limited facilities of the secondary school metal shop. Equipment and tools should be of good quality, properly adjusted, and kept sharp. Stakes must be hard-surfaced. The ductibility of stainless readily adapts it to hollow vessel projects. Special supplies should be used for soft soldering and silver brazing. Though tough, this new medium could well be a challenging type of project material for 10th-, 11th-, and 12th-grade pupils.

4068. JOHNSON, ROY R. ***Planning a Junior High School Comprehensive General Shop.*** **M.A. 1957, San Diego State College, 82 p. L. (San Diego, Calif.)**

Purpose of Study: To show the need for preplanning when new shops are to be put into operation, to list things to be taken into consideration when planning a course of study for an industrial arts program, and to compile a list of equipment and tools for a general shop.

Source of Data: Books, bulletins, dictionaries, periodicals, and other pertinent material. A course of instruction, physical setting, equipping the shop and supply storage areas were set up for a junior high school comprehensive general shop.

Findings and Conclusions: There will be no complete agreement on planning and equipping the shop; however, if general principles are kept in mind, modifications can be made to meet specific needs and situations. In its *Guide for Planning and Equipping Industrial Arts Shops in California Schools,* the California Industrial Arts Shop Planning Committee presents a worthwhile plan, for a comprehensive general junior high shop, which can serve as a starting point for anyone planning a shop.

4069. JOHNSON, THOMAS PAUL. ***Suggested Objectives, Expected Behavior Outcomes, and Recommendations for the Industrial Arts Shops in the Kasson-Mantorville Schools.*** **M.A. 1957, University of Minnesota, 119 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To consider the objectives of education and develop from them industrial arts objectives that will serve the purposes of the Kasson-Mantorville community.

Source of Data: Cumulative records in the Kasson-Mantorville High School, the Dodge County school superintendent's files, and a review of literature and other pertinent writings.

Findings and Conclusions: Presents a guide for better instruction in industrial arts in the Kasson-Mantorville schools.

4070. JORDAN, EDSON DAVID. ***An Occupational Therapy Curriculum Study.*** **M.S. 1955, North Texas State College, 85 p. L. (Denton)**

Purpose of Study: To analyze the occupational therapy training program in the various schools offering a bachelor's degree with a major in occupational therapy.

Source of Data: Catalogs of 25 colleges and universities offering a bachelor's degree with a major in occupational therapy, the official organ of the American Occupational Therapy Association, and books dealing with occupational therapy and curriculum.

Findings and Conclusions: There appeared to be a need for more colleges and universities offering a curriculum of occupational therapy, particularly in the western part of the United States. Occupational therapy majors might select as a minor field of study sociology, education, music, art, industrial arts, speech, or one of the biological sciences.

4071. KAIN, RICHARD DORWIN. ***Orientation in Industrial Arts Teacher Education.*** **M.A. 1956, The Ohio State University, 151 p. L. (Columbus)**

Purpose of Study: To reorganize the orientation features of the industrial arts curriculum of Ohio Northern University. To provide the experiences and outcomes necessary with respect to present-day concepts of industrial arts.

Source of Data and Method of Study: Data applied in conducting the study were obtained from a survey of college orientation courses, interviews with graduates of these courses, consultation with professional leaders, and bibliographical items relevant to the subject of this study. A philosophy of industrial arts was derived and conclusions and implications were drawn from the resulting data and were projected toward reorganizing the orientation curriculum.

Findings and Conclusions: The primary purpose of orientation in industrial arts is to provide insight into the profession. This orientation period should provide experiences in the general, technical, and professional phases of teacher education.

The laboratory, primarily a general shop, should be adequately equipped and arranged, with much of the instruction on an individual basis.

Two orientation courses described in this study were regarded as being highly beneficial by graduates who had experienced the 4-year programs in the respective schools.

4072. KAUMEHEIWA, ALSON I, and BEAL, DANIEL H. ***Production Techniques in an Industrial Arts Metalworking Class.*** **M.A. 1959, University of Minnesota, 124 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To ascertain the feasibility of a production unit in achieving the objective "Interest in Industry." The study is also designed to provide information for classroom teachers interested in conducting a unit in mass production.

Source of Data and Method of Study: Periodicals and textbooks on industrial techniques and types of production. Experience gained in a course on production and automation proved invaluable as a source of production experiences. The class, made up of experienced teachers, indicated the methods, experiences, and solutions employed in their classes. Finally, research data was compiled from a secondary school class in which a production unit was conducted.

Findings and Conclusions: A mass production unit is a teaching technique which naturally involves understanding of industry by students. It is highly motivating and lends itself readily to such educational objectives as cooperation, application of principles, development of skills, planning, and problem solving. However, more studies could be done on other techniques that achieve the objective "Interest in Industry" and their success. The success encountered in using a mass-production unit indicates a functional method of meeting objectives set up by industrial arts instructors. However, there is a need for more texts in this area and also a need for further study on evaluation materials applicable to this type of unit.

4073. KEETON, GERALD DEAN. ***Photography in Industrial Arts.*** **M.S. 1959, Oklahoma State University, 68 p. L. (Stillwater)**

Purpose of Study: To provide a complete photographic process which may be used as a guide to amateur photographers and as an aid to instructors teaching photography.

Source of Data: The library of Oklahoma State University and literature published by manufacturers of photographic supplies.

Findings and Conclusions: The area of photography offers appropriate content for industrial arts.

4074. KIEFFER, THOMAS JAMES. ***High School Grade Point Average and High School Rank as Predictors of Success for Industrial Education Majors at Iowa State College.*** **M.S. 1957., Iowa State College, 38 p. L. (Ames)**

Purposes of Study: (1) To ascertain whether an industrial education major's high school grade-point average or rank in high school graduating class was of more value in predicting academic success at Iowa State College; and (2) to ascertain whether the size of high school graduating class influenced these variables in any manner.

Source of Data and Method of Study: The records of 113 students who had received the degree of Bachelor of Science in industrial education between 1946 and 1956. Predictors were high school average, ACE total score, and high school rank. After the relative value of each of the predictors had been determined, the cases were stratified on the basis of size of high school class, and analysis of covariance was employed with the controls above to test significance.

Findings and Conclusions: Rank and high school average were of about equal value as predictors, with a correlation of 0.21 and 0.23, respectively. ACE total score and high school average produced the best two-variable combination for the prediction of success. The differences in achievement of the subgroups, stratified on the basis of size and graduating class, were not significant.

4075. KEMP, WILLIAM HARRY. ***An Arts and Crafts Program for Mentally Retarded Children in the Junior High School.*** **M.A. 1958, University of Minnesota, 199 p. Department of Industrial Education (Minneapolis)**

Purposes of Study: To define and characterize mental retardation, to ascertain the needs that are satisfied through an arts and crafts program for retarded children of chronological ages 12 through 15, and to develop an arts and crafts program to provide for these needs.

Source of Data: Primarily, a survey of the literature on retardation. The information and techniques employed in the instructional units were derived from personal experience in teaching retarded children.

Findings and Conclusions: A review of the literature on mental retardation, arts and crafts, the objectives for the mentally retarded, and education in general is a necessary prerequisite for the development of a normal crafts program for mentally retarded children.

4076. KENDRICK, ALBERT CHARLES. *To Make Recommendations for a Program of Industrial Arts Teacher Education With Special Reference to British Columbia.* Ed. M. 1957, Western Washington College of Education, 60 p. L. (Bellingham)

Purpose of Study: To develop a basis for a new curriculum of industrial arts teacher-education to be instituted in British Columbia.

Source of Data: The survey method was used, and data were gathered from theses, surveys, college catalogs, government bulletins, and a questionnaire.

Findings and Conclusions: Industrial arts courses in high schools are desirable. A change in British Columbia's system is indicated; 492 teacher-educators in industrial arts suggest that the program be equally divided among general education, professional education, and shop skills and that prerequisites be the same for all teacher-educators and the same degree granted. All persons connected with industrial arts should be consulted in curriculum building.

4077. KERPICCI, ALI KEMAL. *Selected Instructional Material for the Preparation of Trade and Industrial Teachers in Turkey.* M.S. 1959, Stout State College, 86 p. L. (Menominie, Wis.)

Purpose of Study: To analyze and to select instructional materials that may be used as a guide for the improvement of the education of trade and industrial teachers in the Men's Technical Teachers Training College at Ankara, Turkey.

Source of Data and Method of Study: The normative survey type of research which included documentary, interview, and observation methods was used. The types of literature reviewed were: (1) literature in the field of instructional materials and methods, (2) instructional materials used at Stout State College, (3) industrial publications selected for their instructional value. On the basis of the findings of the survey, the instructional materials were analyzed, selected, classified, and interpreted.

Findings and Conclusions: The need of instructional materials and methods for improving trade and industrial teacher education in Turkey was apparent, based upon the analysis of various types of instructional materials and methods used in selected vocational schools in the United States.

The many kinds of materials and methods selected and classified can only suggest further preparation of instructional aids for each trade and subject. These resource materials will be effective only if the teachers understand what is to be accomplished and are able to communicate the necessary knowledge.

4078. KING, LEONARD CHARLES. *Amateur Radio in the Senior High School Industrial Arts Program.* M.A. 1957, San Diego State College, 130 p. L. (San Diego, Calif.)

Purpose of Study: To make suggestions to aid in the revision of the present system of teaching electronics in order to stimulate more interest in the field.

Source of Data: Books, guides, and courses of study, pamphlets and bulletins, and periodicals pertinent to the study. A progressive project formulated for this study was then used to progress from the simple to the complex in both shop work and class discussion.

Findings and Conclusions: The beginning electronics program was compared with the processes used or steps followed by a person who desired to become an amateur radio operator or "ham." The usable and desirable contents of amateur radio were then integrated with industrial arts electronics.

4079. KLEIN, LOUIS, Jr. *Management Development in Selected Small Manufacturing Industries in the State of Utah.* M.S. 1956, Utah State University, 45 p. L. (Logan)*

Purpose of Study: To ascertain what is being done in management development in selected small manufacturing industries in the State of Utah. Emphasis is given to what is actually being done rather than to what ought to be done.

Source of Data: A questionnaire based upon the direct results of library research pertaining to philosophies and methods of management development and some research pamphlets written by individuals considered to be authorities in the management field. Quantitative aspects in relation to management development plans were considered on the aspects of geographical location, industry coverage, and company size-coverage.

Findings and Conclusions: The study showed that about one-third of the companies had formal plans of management development and about one-third of them had informal plans. A majority of the plans reported were designed by the companies themselves. Job experience, understudy, coaching, and individual counseling, in this order, were the most frequently used management-development techniques in companies with formal plans; the order was coaching, understudy, individual counseling, and job experience for companies with informal plans. Larger companies were primarily the ones with formal management development plans. Companies with the smallest number of employees were interested in management development but used an informal approach without integrating the program as a definite part of their organizational structure. Companies with the smallest number of employees (from 20 to 119) showed the greatest interest in management development. Formal plans of management development seemed to be more consistent and enduring than informal plans.

4080. KUEHL, HENRY WILLIAM. *Employment Data for Drafting Positions in Seven Northeastern Iowa Cities.* M.A. Ed. 1958, Iowa State Teachers College, 142 p. L. (Cedar Falls)

Purpose of Study: To collect occupational data which would be useful for counseling high school students or anyone else interested in drafting as an occupation.

Source of Data: Interviews by the writer with representatives of all drafting departments located in the area studied.

Findings and Conclusions: One hundred twenty-eight firms were located which required some form of drafting; 943 draftsmen were employed at the time of the study and 59 were to be employed by the end of 1958. The order in which each type of drafting was most frequently done is as follows: Mechanical, electrical, sheet metal, architectural, tool and die, heating and ventilating, plumbing, reinforced concrete, civil, construction, records (gas, water, heat and power), refrigeration, map, furniture, overhead, patent, aeronautical, and landscape. Many of the draftsmen did supervisory, experimental, field, sales, shop and clerical work in addition to drafting. Training requirements varied from over 4 semesters of college for engineers to 1 semester of high school drafting for tracers. The most common methods for securing draftsmen were through college placement, direct application, apprentice training, and employment offices. Drafting positions were available only to people who had had high school drafting.

4081. KUZNIAR, JOSEPH FRANCIS. *Trends of Industrial Arts in the State of Minnesota.* M.A. 1958, University of Minnesota, 67 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To summarize descriptive facts about the nature and extent of industrial arts programs offered in the public secondary schools during the years 1945–46 and 1955–56, and to indicate trends, changes, or new developments that have taken place during this decade.

Source of Data: Analysis and tabulation of factual materials from the State department of education records.

Findings and Conclusions: Industrial arts programs expanded in the following ways: enrollments of boys and girls increased; the number of industrial arts departments rose from 193 to 354; industrial arts programs were considerably broadened for the seventh, eighth, ninth, and tenth grades. No significant changes were found in the eleventh-and twelfth-grade curriculum.

4082. LAMBOUSY, JOHN G. *Effectiveness of Vocational Training at the Southwest Louisiana Vocational-Technical School.* M. Ed. 1958, Colorado State University, 101 p. L. (Fort Collins)

Purpose of Study: To ascertain the effectiveness of the vocational education program of the Southwest Louisiana Vocational-Technical School with reference to job placement, job promotion, earnings, and followup procedures.

Source of Data: College catalogs, letter requests, and questionnaires. A checklist form of questionnaire was used.

Findings and Conclusions: It was found that the instructors of the school were responsible for and instituted placement and followup services. Each instructor had available 2 hours for this activity each school day. It was concluded that the employment of a part-time or full-time professionally trained guidance worker at the school would allow the program to be strengthened and would enable the school graduates to be contacted more readily.

4083. LARSEN, ELDRID S. *The Relationship Between IQ and Grades Received by Students at the Logan Junior High School in Industrial Arts as Compared with Other School Subjects.* M.S. 1959, Utah State University, 54 p. L. (Logan)

Purpose of Study: The study sought answers to the following questions: What is the relationship between IQ and final grades in the industrial arts classes? What is the relationship between IQ and final grades in the academic classes? Is there a correlation between IQ and final grades received by the same students in the industrial arts and the academic classes? Is the difference between IQ and final grades received in industrial arts and the academic classes significant?

Source of Data and Method of Study: The cumulative records were used to secure the information on IQ and final grades. A comparison was made between the final grades and IQ in each subject area to determine whether there was a definite correlation. The Pearson Product-Moment Method was used. Regression lines were used to show the relationship between IQ and final grades in each subject area and to determine whether there was a significant difference between IQ and final grades in these subject areas.

Findings and Conclusions: In general, boys with a lower IQ receive higher grades in industrial arts than in the academic subjects. In general, boys with a lower IQ receive lower final grades in the academic subjects than in industrial arts. The correlation between IQ and final grades is low in industrial arts and the academic subjects, but still significant at the 0.01 level in both areas. The relationship between IQ and final grades in ninth-grade industrial arts as compared with ninth-grade English and algebra is not significant at the 0.01 or 0.05 level. The relationship between IQ and final grades in the eighth-grade industrial arts as compared with eighth-grade English and mathematics is significant at the 0.01 level. The relationship between IQ and final grades in seventh-grade industrial arts as compared with seventh-grade English is significant at the 0.01 level and with seventh-grade mathematics is significant at the 0.05 level.

4084. LARSON, CLIFTON B. ***A Study of Occupational Requirements for Specialized Machinist, Inspector, and Tool Technicians in Utah Industry.*** **M.S. 1959, Utah State University, 81 p. L. (Logan)**

Purpose of Study: To ascertain the requirements in knowledge and skill for technicians in machine planning, inspection, tool making, tool design, and estimating in Utah industries. To ascertain whether there is a common basic core of information in the background of training given these technicians.

Source of Data: Personal interviews with individuals in industry who were classed as technicians, or with supervisors of technicians who worked in the kinds of jobs included in this study. An interview form was used in order to make the interviews as similar as possible.

Findings and Conclusions: The study showed that the technicians employed in the jobs included in this study were concerned with the efficient use of men, materials, and machines in mass production. They worked as liaison men between the project engineer and the production shop. They laid out machinery and equipment, planned the flow of work, analyzed production costs, and studied different production methods for the purpose of improving their own. Most of the technicians were employed as foremen or supervisors in manufacturing operations.

Persons planning to work as technicians in the areas included in this study should have a background of practical experience in the production shops, coupled with education beyond high school. Training in psychology, written and oral communication, and applied mathematics was required of the technicians. Mathematics beyond trigonometry was generally not required. Some knowledge of basic science, principles of mechanics, heat, electricity and magnetism, metallurgy, and heat treatment of metals was found to be helpful. Engineering training, as such, was a very limited requirement. Only 25 percent of the technicians in this study did any research work on materials.

4085. LARSON, MILTON ERVING and O'LOUGHLIN, SIMON THOMAS. ***A Follow-Up Study of Selected Graduates of Dunwoody Industrial Institute.*** **M.A. 1956, University of Minnesota, 122 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To ascertain the reactions of graduates of Dunwoody Industrial Institute to the training received, to ascertain the success and position of these graduates at the time of the study in the world of work, and to invite suggestions that would promote more effective vocational education.

Source of Data: A questionnaire sent to the graduates of Dunwoody Industrial Institute, the Minneapolis Public Library, the Department of Industrial Education of the University of Minnesota, and the records of Dunwoody Industrial Institute.

Findings and Conclusions: Most of the graduates contacted were satisfied with the training obtained, the trade in which they were employed and the opportunities for progress on the job. Eighty-seven percent were working in some capacity in the trade for which they were trained or in a related field. Nearly one-third were earning $100 a week or over at the time of the study, and 38 percent had had more than four pay raises since graduation. The conclusions that Dunwoody Industrial Institute is successfully training men for positions in industry is clearly indicated by this study.

4086. LEDUC, ROBERT JOSEPH. ***The History and Present Status of Industrial Arts in the Public Schools of British Columbia.*** **M.S. 1958, Oregon State College, 147 p. L. (Corvallis)**

Purpose of Study: To outline the growth which has taken place in the field of industrial arts since its inception in 1901 in the Province of British Columbia, and to ascertain the status which industrial arts presently holds in this province.

Source of Data: Public school reports, reports of commissions and surveys, biannual reports of industrial arts instructors to the Department of Education, Department of

Education publications, and interviews with men both in the field and retired.

Findings and Conclusions: The expansion of industrial arts in the Province of British Columbia has been one of gradual extension rather than one of radical change. A definite need exists for the demonstration of the values of industrial arts to the general public. Further study needs to be conducted in order to ascertain the number of high school industrial arts majors. Some effort should be made by the British Columbia Shop Teachers' Association to provide information such as photographs accessible at the Provincial Archives in Victoria depicting the history of industrial arts.

4087. LEE, IVAN E. *A Study and Evaluation of the Automotive Program at the Utah State Agricultural College.* M.S. 1955, Utah State University, 73 p. L. (Logan)*

Purpose of Study: To ascertain the value of the automotive training program at the Utah State Agricultural College in terms of its contributions to student success after graduation and its value to the automotive industry. To compare this program with those of other schools offering courses in the automotive field, including vocational schools as well as those teaching mechanical engineering.

Source of Data and Method of Study: The questionnaire method was used for this study because information had to be received from many areas of the United States. Some personal interviews and letters were also found to be valuable in obtaining additional information and opinions.

Findings and Conclusions: Respondents from industrial organizations agree that graduates from the Automotive Department of the Utah State Agricultural College are well qualified in industrial technology. They recognize the value of the type of training the graduates have received and stress the need for the type of education outlined in the curriculum. They are willing to accept applications of such graduates for employment in their organizations. The automotive industry is willing to accept the present program and feels it deserves a Bachelor of Science Degree. The automotive courses offered at mechanical engineering schools were rated higher than the automotive courses offered at Utah State Agriculture College, but the level of training was found to be higher academically than those of vocational schools and would better meet the vocational and technical demands of industry.

4088. LEETH, JAMES C. *A Study to Determine the Need for Industrial Activities for Enriching the Elementary Curriculum in the Fort Worth Public Schools.* M.S. 1958, North Texas State College, 127 p. L. (Denton)

Purpose of Study: To ascertain the need of industrial arts activities for enriching the elementary curriculum in Fort Worth Independent School District, Fort Worth, Texas.

Source of Data: Available literature, letters, and other descriptive materials of elementary programs in Texas and other States, curriculum guides prepared for Fort Worth elementary teachers, and questionnaires prepared by Fort Worth elementary teachers and principals.

Findings and Conclusions: Certain units of learning now being taught at the elementary level can be enriched by including industrial arts activities. There is a need for an organized program to assist elementary teachers in providing industrial arts experiences. Both teachers and principals favored the inclusion of more industrial arts activities at the elementary level. Findings indicate it would be desirable to add facilities and set up a pilot program in one of Fort Worth's 62 elementary schools to secure data for further study.

4089. LOGAN, JACKSON LEE. *Industrial Arts at the Iowa State Teachers College 1904 to 1957.* M.A. 1957, Iowa State Teachers College, 156 p. L. (Cedar Falls)

Purpose of Study: To present the establishment and development of industrial arts at the Iowa State Teachers College from 1904 to 1957.

Source of Data: Annual catalogs, letters of past presidents, records on file with the archives office, the registrar of the industrial arts department, and personal interviews.

Findings and Conclusions: The industrial arts program was first offered on the campus in 1904 and was called manual training. The first courses offered were in wood, drawing, and elementary manual training. By 1957 the department had a new and enlarged physical plant with seven full-time instructors, facilitating both undergraduate and graduate offerings. Over 10 percent of the male graduates at the college are in the field of industrial arts annually.

4090. LUNDMAN, DONALD GRANT. *A Resource File of Test Items Intended to Measure the Fulfillment of Specific Objectives in Mechanical Drawing.* M.A. 1957, University of Minnesota, 177 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To develop a file of test items to facilitate the construction of tests for the measurement of achievement in any of the several areas of mechanical drawing.

Source of Data and Method of Study: A review of the literature on testing and on objectives was made, from which a composite list of common objectives and test item material was compiled. Test items were classified as to topic and type, and keyed to specific objectives for mechanical drawing.

Findings and Conclusions: Better testing can be accomplished through the selection of specific test items on the basis of course objectives. This paper should help the instructor of mechanical drawing to construct tests that will actually measure the fulfillment of course objectives.

4091. LUTZ, LARRY LEE. ***Current Practices and Procedures of Selected Foundries.*** **M.A. 1959, Northeast Missouri State Teachers College, 100 p. L. (Kirksville)**

Purpose of Study: To ascertain the current practices and procedures followed in patternmaking, coremaking, molding, pouring, shake out, and inspection.

Source of Data: Three foundries, by observation: A. B. Chance, Centralia, Mo.; Gardner-Denver Company, Quincy, Ill.; John Deere, Ottumwa, Iowa.

Findings and Conclusions: Foundries are becoming more mechanized in their materials handling and are using newer and better production methods. Some of the methods noted were: the use of gypsum for tooling of the plastic patterns, and the use of sodium silicate plus CO_2 and thermosetting plastic resins for core and mold hardening. New methods of controlling sand consistency, metal alloys, and casting dimensions and quality were also evident.

4092. McARTHUR, ROSS J. ***A Study of Influential Factors in the Development and Unification of American Standard Screw Threads.*** **M.S. 1953, Utah State University, 143 p. L. (Logan)***

Purpose of Study: To clarify the situation regarding the standardization of screw threads including the developments that have taken place, where they took place, and the reasons for their development. Special emphasis is given to ascertaining the influential factors that brought about standardization.

Source of Data: A careful review of literature in the field, personal interviews with individuals involved in the standardization of screw threads, and the records of organizations working on the problem. Visits were made to many cities in the United States in order to contact key persons.

Findings and Conclusions: Through the untiring and persistent efforts of certain individuals and groups over the past century, screw threads have kept pace with national requirements. Methods of cutting threads have had a great deal to do with thread forms used in Great Britain and the United States. Canada did very little proposing of suggested standards, but was a steadying influence. Threads were first cut by chasing tools and later by the rolling process and on centerless floating tops in the United States. Sir Joseph Whitworth of England and William Sellers of the United States introduced and developed standards. A number of organizations have been instrumental in bringing about standardization.

4093. McCALL, LAWRENCE DAVID. ***An Industrial Arts Transportation Program for Secondary Schools.*** **M.A. 1955, The Ohio State University, 92 p. L. (Columbus)**

Purposes of Study: To present the importance of transportation in the teaching of technology and ascertain programs which are now emphasizing land, sea, or air transportation; to present methods used in establishing a transportation program with suitable teaching aids and equipment and a comprehensive laboratory to teach transportation.

Source of Data: Surveys were made for methods, techniques, and equipment which might be used in a transportation laboratory and program. Previous research in the field, programs now in operation, industrial museums, and aids from manufacturers and associations were also used.

Findings and Conclusions: Few schools include elements of transportation in their program. Content for a suitable program of transportation may be derived from an analysis of the transportation industry, which has a wide range of materials, equipment, and teaching aids available. Plans for a laboratory are included.

4094. McCLASKEY, BILLY KEITH. ***Suggested Information Topics and Teaching Methods and Aids for Presenting Related Information in the Industrial Arts General Shop Course.*** **M.A. 1959, Northeast Missouri State Teachers College, 168 p. L. (Kirksville)**

Purpose of Study: To formulate some ideas or suggestions relative to what related information should be presented in the industrial arts general shop course.

Source of Data: An investigation of periodicals, reference books, and State courses of study for general shop.

Findings and Conclusions: There has been little published by authors, leaders, teachers, and State departments of education on the identification and clarification of the information which should be covered in an industrial arts general shop course. The State courses of study contained the most complete listings of related information topics, teaching methods, and aids recommended for use in the industrial arts general shop course.

4095. McKAY, JOHN RICHMOND. *The Religious Aspects of Labor.* M.S. 1955, North Texas State College, 75 p. L. (Denton)

Purpose of Study: To review the literature concerning religion and the attitude of religious leaders toward labor, with emphasis upon crafts; to ascertain whether industrial arts experiences contribute toward a better understanding of the meaning of religion.

Source of Data: Studies of the eleven living religions and translations of the Talmud, the Avesta, the Koran, and the Bible.

Findings and Conclusions: A majority of the leaders in the field of religion were taught a trade and did some type of work at various times. Some found work distasteful; others thrived through it. It was found that eight of the religions—Hinduism, Jainism, Buddhism, Confucianism, Taoism, Shinto, Sikhism, and Zoroastrianism—did not include and preach work as such in their doctrines. Judaism, Christianity, and Islam do preach the doctrine of work and demand that their adherents perform some type of work. Religion and work tend to give an individual a field of self-respect and a sense of responsibility, and as a result, it was concluded that industrial arts could contribute toward the religious development of the individual.

4096. McKINNON, MAX E. *The Place of the General Shop in the Industrial Arts Curriculum in the Secondary Schools of Utah.* M.S. 1954, Utah State University, 55 p. L. (Logan)*

Purpose of Study: To ascertain to what extent the general shop type of organization is used in presenting the industrial arts program in Utah, and to show some of the influencing factors on the development and trends of the general shop idea.

Source of Data: A questionnaire sent to the industrial arts instructors in Utah and a summarization of a general review of literature on the general shop.

Findings and Conclusions: More students can be instructed in more areas of industrial arts by the general shop method than by any other, and at a considerably lower cost per area of study. In Utah there are 223 unit shops as compared to 96 general shops. The general shop is being used more in the smaller schools. Only about 5 percent of the girls in the secondary schools of Utah take industrial arts courses.

4097. McKNIGHT, ROBERT M. *The Grinding Wheel—A Resource Unit for Industrial Arts Education.* M.A. 1956, University of Florida, 97 p. L. (Gainesville)

Purpose of Study: To compile and evaluate data concerning the sharpening stone for use as a resource unit.

Source of Data: Books, articles, pamphlets, and interviews with commercial producers.

Findings and Conclusions: This study developed a comprehensive survey of the development and uses of abrasives.

4098. McLEAN, GERALD J. *Industrial Arts in Lake County, Florida—A Survey and Proposal.* M. A. 1957, University of Florida, 90 p. L. (Gainesville)

Purpose of Study: To set the stage for the overall improvement of industrial arts programs in the secondary schools of Lake County, Florida.

Source of Data: Books and articles by leaders in the industrial arts field and a first-hand study of the curriculums of all Lake County secondary schools.

Findings and Conclusions: Industrial arts programs should be extended to several of the junior and senior high schools in the county, and specific improvement and expansion of offerings in all others should be made.

4099. McNEELY, HAROLD POWELL. *Survey of Guidance Programs in Technical Vocational High Schools.* M. S. 1958, The University of Michigan, 49 p. Education L. (Ann Arbor)

Purpose of Study: To ascertain what types of guidance services were currently being used in vocational high schools.

Source of Data: A questionnaire sent to schools of all sizes, in all sections of the country, which offered an all-day trade and industrial program.

Findings and Conclusions: There were 114 schools participating in the study; 84 percent have what they consider to be an organized guidance program, but only 50 percent of them maintained a full-time staff of guidance persons. Fifty-nine percent of the incoming freshmen in vocational schools do not undergo a comprehensive testing program. The guidance service most offered is counseling, with placement ranking second. Technical vocational high schools should make available to students all aspects of a good comprehensive guidance program, since the prime objective is gainful employment upon graduation.

4100. McROBBIE, JOHN M. *Procedures in Establishing a Mobile Shop Program at County Level.* M.A. 1955 San Diego State College, 335 p. L. (San Diego, Calif.)

Purpose of Study: To describe and document the operation of the mobile shop program in its role of vitalizing the social studies and related industrial aspects of our culture for children of rural elementary schools in San Diego County.

Source of Data: Books, bulletins, periodicals, public documents, and unpublished materials.

Findings and Conclusions: Initiation of a successful county-level mobile shop service requires thorough planning. Care must be used in determining the need for and feasibility of mobile equipment. To make a sustaining contribution to the educational program of any school system, a service of this type should remain highly flexible.

4101. MACK, EMANUEL. *A Proposed Plan for the Teaching of Industrial Arts in the Lincoln High School, College Station, Texas.* M.S. 1958, Prairie View Agricultural and Mechanical College, 30 p. L. (Prairie View, Texas)

Purpose of Study: To propose an improved program of industrial arts for Lincoln High School which will be consonant with the needs of the pupils, school, and community of College Station.

Source of Data: A survey of literature, records, and reports, and an analysis of the existing industrial arts program at Lincoln High School.

Findings and Conclusions: The offerings of the existing industrial arts program are extremely limited, being confined to experiences in woodwork only. In addition, physical facilities, including both space and equipment, are limited. It is proposed that the industrial arts program be revised in these respects: (1) Curriculum—to include experiences in woodwork, electricity, and drawing; and (2) physical facilities—a new shop to be constructed with sufficient facilities to provide experiences in the foregoing areas with an average class enrollment of ten students.

4102. MANION, THOMAS OTHELLO, JR. *Automation and Its Impact on Selected Industrial Education Programs.* M. S. 1956, Iowa State College, 130 p. L. (Ames)*

Purpose of Study: To ascertain whether education programs are being, or are going to be, affected by the automation of industry.

Source of Data: A questionnaire sent to industries using automated installations.

Findings and Conclusions: Automation consists of basic component units which can be taught in the high school. Demands for increased programs for adult education and apprenticeship training can be directly attributed to automation.

4103. MANN, JACK FAYE. *A follow-up Study of the Graduates of Northeast Missouri State Teachers College with Majors in Industrial Education 1938 to 1958 Inclusive.* M. A. 1959, Northeast Missouri State Teachers College, 80 p. L. (Kirksville)

Purpose of Study: To obtain information concerning the graduates of Northeast Missouri State Teachers College who received a Bachelor of Science or Bachelor of Science in Education degree with a major in industrial education in the years 1938 to 1958, inclusive.

Source of Data: An information form sent to 234 of the 250 graduates. Six graduates were deceased and ten addresses could not be found. A total of 189 (80.8 percent of the information forms sent out) were returned properly filled out.

Findings and Conclusions: A majority of the graduates are native Missourians and remain in Missouri after graduation. Most of the graduates own their homes, and a significant number of them either designed or built their own homes. There is a trend for the graduates to do advanced work beyond the bachelor's degree level. The graduates tend to advance in the same field as their undergraduate major. Teachers tend to advance beyond the bachelor's degree level more than the nonteachers do. The average regular salary of the nonteacher is greater than the teacher's; more teachers tend to supplement their regular salaries with part-time work. The graduates who are teachers receive a higher average part-time salary than do the nonteachers. A large majority of the industrial education graduates enter the field of education. The industrial education curriculum at the Northeast Missouri State Teachers College, while primarily designed for teacher preparation, has also been beneficial to those who entered business, industry, or other nonteaching occupations.

4104. MARKEN, MARZALE LYNFOCH. *Selected "Interest-stimulating" General Shop Projects Which Exhibit*

Good Design. M.A. 1956, University of Minnesota, 85 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To provide a single-source reference of interest-stimulating projects for the frequently taught areas of the small general shop and to present project plans which have been designed, redesigned or selected in terms of a formulated set of criteria for evaluation of project design.

Source of Data: A review of the literature pertinent to the study.

Findings and Conclusions: All projects used in shop classes should be periodically reevaluated to conform to improved or new methods of construction and new materials available.

4105. MARSH, JAMES DAVIS. *Some Problems Encountered When Teaching Photography in the Area of Industrial Arts.* M.A. 1957, San Diego State College, 137 p. L. (San Diego, Calif.)

Purpose of Study: To review the goals and objectives of industrial arts and determine their relationship to those of photographic instruction.

Source of Data: Books, government publications, learned societies, periodicals, pamphlets, and unpublished materials; also personal interviews with teachers of photography in the San Diego area.

Findings and Conclusions: The suggested total program, the personal interview survey, and the review of literature indicated that when the organization was complete and all objectives and goals put into practice, a worthwhile and highly educational experience was made available to the students. In many cases the results of such work were in direct proportion to the desires of the students and the abilities of the teacher.

4106. MARSH, ROBERT HARLEY. *Consumer Education in Industrial Arts.* M.S. 1956, Stout State College, 140 p. L. (Menomonie, Wis.)

Purpose of Study: To ascertain the methods of instruction and the course content which will best meet the consumer needs and interests of senior high school students.

Source of Data: A questionnaire sent to members of the senior class of Menomonie High School and to graduate students attending Stout State College in 1956.

Findings and Conclusions: Menomonie High School seniors are in agreement as to their future needs in consumer education. The future needs expressed by the Stout graduate men and by the Menomonie High School seniors are generally in agreement. Interest is quite independent of expressed needs.

4107. MARTIN, CLIFFORD DEAN. *Value of Industrial Arts Courses to Graduates of the Brashear, Missouri, High School.* M.A. 1959, Northeast Missouri State Teachers College, 43 p. L. (Kirksville)

Purpose of Study: To ascertain the value of industrial arts course contributions to occupations and hobbies in the opinion of former students of Brashear High School.

Source of Data: A questionnaire mailed to students who had graduated from the Brashear Public School during the past 10 years.

Findings and Conclusions: The present curriculum is deficient in the fields of drafting, electricity, and metalworking. Woodworking projects have been greatly overemphasized, with a consequent lack of emphasis upon the acquisition of basic woodworking skills. A definite attempt should be made to meet the needs of the future farmers who comprise the largest occupational group in the study.

4108. MATHIS, CHARLES A. *A Proposed Program of Industrial Arts for Grades Seven Through Twelve in the Dunbar High School, Mineral Wells, Texas.* M.S. 1958, Prairie View Agricultural and Mechanical College, 57 p. L. (Prairie View, Texas)

Purpose of Study: To study the existing curriculum of industrial arts at Dunbar High School of Mineral Wells, Texas, and propose a revised curriculum which will include a more varied offering in industrial arts.

Source of Data: Data were secured through a survey of the literature pertaining to the problem under study. The existing industrial arts program was thoroughly studied and analyzed, and the data secured from the literature used as a basis for the proposed curriculum change.

Findings and Conclusions: The existing curriculum in industrial arts at Dunbar High School consists entirely of courses in woodwork which are available to students in grades 7–12. In order to meet more fully the needs of the students and of the community, the curriculum should be revised to include offerings in woodwork, metalwork, and drawing organized on the unit general-shop plan. This will necessitate a reorganization of the existing shop layout and provision of additional equipment, tools, and machinery.

4109. MATTSON, WILLIAM LEE. *A Study of Educational Films in the Industrial Arts Areas of Wood, Metal, Drawing and Crafts.* M.A. 1956, University of Minnesota, 116 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To gather resource material in film appraisals and evaluations, information concerning the methods of better utilization of films, examples of evaluations of basic industrial arts films, and thus establish a reference library of sources of educational films.

Source of Data: Sample evaluation forms collected from other institutions and audiovisual departments; reference material collected from leading books, periodicals, and other publications; and films from the audiovisual education service and the extension film library, University of Minnesota.

Findings and Conclusions: The purpose of the film and the instructor using it determine whether the film is worthwhile. Evaluation forms were collected, and a list of sources of educational films was compiled.

4110. MAURER, GLENN E. *Instructional Materials from Industry for Junior High School Industrial Arts.* M.A. 1957, University of Minnesota, 78 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To compile materials from industry that can be used satisfactorily in the industrial arts department of the junior high school; to classify them as to form, grade level, and area covered; to give a brief description of each item; and to give the source for the purpose of obtaining additional copies.

Source of Data and Method of Study: A source criterion was established. Two industrial arts periodicals, *School Shop* and *Industrial Arts and Vocational Education,* were chosen for their lists of industrial advertisers. The *Thomas Register of American Manufacturers* was consulted. Information was also furnished by staff members in the industrial education department of the University of Minnesota.

Findings and Conclusions: Industries do publish material of considerable benefit to an industrial arts instructor in the junior high school; this material is important as a supplement to the curriculum, not as a replacement. Industries are eager to place schools on their mailing lists for advertising materials; more than one-half of the industries contacted responded with some type of material, but less than one-half of the material received was evaluated as a teaching aid. The rest of the material was either too complex for junior high school, or it was not in junior high school industrial arts area, or it was simply advertising and of no educational value. Industries have more material for metalworking and woodworking than any of the ten other areas included in this study.

4111. MECHAM, ARLIN L. *The Preparation of Activity Assignment Sheets for a Course in General Metal Work on the Junior High School Level.* M.S. 1958, Utah State University, 152 p. L. (Logan)*

Purpose of Study: To establish the objectives for this course of study in junior high school general metal work, and to list the desired student behavioral changes. To determine the manipulative and informational activities to be used in the preparation of this course of study. To prepare the activity assignment sheets needed for this course of study.

Source of Data: A thorough study of available literature in the field of industrial arts education was made to find out what content should be included in such a course. A selection of the manipulative and informational activities was made, and these served as the basis for the course of study.

Findings and Conclusions: There is a wealth of material available to teachers of industrial arts which can be analyzed for subsequent inclusion in courses of study. Course development and course evaluation should be based on recognized objectives. The formulation of statements of related facts, attitudes, and skills around the objectives of a particular course of study produces a refined product, which is useful in course planning and evaluation.

4112. MEEHAN, MICHAEL J. *Audio-Visual Aids and Materials Used in Industrial Arts Courses in Selected Public Secondary Schools of Missouri.* M.A. 1958, Northeast Missouri State Teachers College, 69 p. L. (Kirksville)

Purpose of Study: To determine the status and value of audiovisual aids and materials used in industrial arts in selected public secondary schools of Missouri and to ascertain current practices in the use of audiovisual aids by the industrial arts teachers.

Source of Data: A questionnaire sent to industrial arts teachers of selected secondary schools. Supplementary and explanatory material was taken from periodicals, textbooks, pamphlets, organizational publications, and from other research papers.

Findings and Conclusions: Aids and materials are being used by most industrial arts instructors in the secondary schools of Missouri. A large percentage of the instructors, however, are not using slides, mockups, process models, and cutaway equipment. As "pet aids," motion pictures and chalkboards rank high by the industrial arts instructors. They consider the majority of audiovisual aids and materials of value for industrial arts use. Free instructional materials prepared by industry were used by most of the industrial arts instructors. Workshops and conferences on audiovisual methods would be beneficial to industrial arts instructors, regardless of former training, as a means of keeping them well informed on new improvements or innovations.

4113. MEIXNER, G. HAROLD and SEITZ, ROY W. *General Information for Metalwork in Junior High School Industrial Arts.* M.A. 1958, University of Minnesota, 210 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To make a collection of short stories, interesting and phenomenal in nature, related to junior high school metal work, which are intended to provide enrichment material that can be readily used by students.

Source of Data: Manufacturers, industrial concerns, and literature pertinent to the subjects.

Findings and Conclusions: The authors have discovered that it is possible to write many stories related to metal work. As new methods and materials are developed more stories will unfold. The stories have been read by English teachers who have given enthusiastic support for their use.

4114. MELLMAN, ROBERT A. *A Plan to Develop and Expand the Vocational Education Program in the Metropolitan Area of Easton, Pennsylvania.* M.S. 1952, The Pennsylvania State University, 62 p. L. (University Park)

Purposes of Study: To: (1) learn the occupational destination of area high school male graduates; (2) determine the trade and industrial training to be taught in the vocational department of the schools; (3) examine the area high school curriculums and male enrollment in each; and (4) formulate a plan of operation for the vocational department of the schools in that area.

Source of Data and Method of Study: All area high school male graduates of 1947–51 received questionnaires to determine their present occupations, high school preparation, and the curriculums they would recommend to students planning similar vocational objectives. Questionnaires were sent to all area ninth-grade male students to reveal the courses of study they plan to pursue, their plans concerning college or work, and what course of study they would pursue if it were possible to select from a variety of vocational offerings. Also a questionnaire was sent to all industries in the area to secure information about occupations, number of employees, and availability of workers. The Easton High School curriculums and enrollment were studied over a period of 5 years to show the effectiveness of vocational education in reducing the number of "general" students.

Findings and Conclusions: The majority of male graduates are employed at "factory work and trades" and now recognize the contribution vocational education could have made in preparing them for work. For the most part graduates who entered college felt the college preparatory work was adequate. Most ninth-grade boys not planning to go beyond high school expressed a preference for vocational training. The present vocational trade and industrial shop facilities are overcrowded. Trained workers are not available to meet the placement opportunities in the skilled and semiskilled trades.

4115. MILLER, SAMUEL AUSTIN, Jr. *Analysis of the Adequacy of Preparation of Industrial Arts Teachers in Pennsylvania for Sponsoring Cocurricular Activities in Secondary Schools.* M.S. 1956, The Pennsylvania State University, 63 p. L. (University Park)

Purpose of Study: To determine the adequacy of preparation of industrial arts teachers to sponsor cocurricular activities.

Source of Data and Method of Study: A comprehensive study of related literature and factors involved in the preparation of industrial arts teachers for sponsorship. Basic factors involved in the qualifications for guiding and directing activities were: (1) supervised practice, (2) professional preparation, and (3) participation in cocurricular activities. These factors were incorporated in a checklist type questionnaire and sent to a comprehensive list of industrial arts teachers in Pennsylvania.

Findings and Conclusions: Of the respondents, 93 percent sponsored at least one cocurricular activity. The mean number of activities sponsored by industrial arts teachers was 2.33. The most common activities were: (a) industrial arts clubs—52 percent; (b) homeroom—46 percent; (c) assemblies—40 percent; and athletics—31 percent. No professional preparation for guiding and directing activities was claimed by 51 percent of those responding. Tabulations indicated that 88 percent of the sponsors had participated in college activities and 92 percent had participated in postcollegiate avocational activities. It is recommended that institutions training industrial arts teachers in Pennsylvania consider changing their curriculums as they relate to the guiding and directing of activities.

4116. MILLOY, COURTLAND TERRELL. ***An Evaluative Study of the Industrial Arts Program in the Booker T. Washington Senior High School of Shreveport, Louisiana, During the Year 1958–59.*** **M.A. 1959, University of Minnesota, 157 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To ascertain to what extent the industrial arts program may be altered to function more effectively as an educational service.

Source of Data: (1) Study of industrial arts bulletins from other States, (2) survey of pupils enrolled in industrial arts classes during the year 1958–59, (3) personal contacts with industrial arts teachers, (4) study of the industrial status of the Shreveport community, (5) evaluation of the industrial arts program.

Findings and Conclusions: The following suggestions were offered for the improvement of the industrial arts program: (1) An option of two tryout courses or one 36-week course in the tenth grade; (2) More specialization in the eleventh and twelfth grades for pupils who need and want it; (3) A greater variety of materials and supplies for instructional purposes; (4) Adequate provisions made for producing and utilizing certain instructional aids; (5) A greater amount and variety of equipment in the following areas: general metals, automechanics, graphic arts, and electricity; (6) More work experience by industrial arts teachers during the summer months in related occupations represented in their specific teaching areas.

4117. MOBLEY, CHARLES F. ***Some Problems Encountered in Establishing a Graphic Arts Program at the Junior High School Level.*** **M.A. 1956, San Diego State College, 88 p. L. (San Diego, Calif.)**

Purpose of Study: To devise a guide containing information and suggestions to be used by beginning teachers in the junior high school graphic arts area.

Source of Data: Books, bulletins, dictionaries, and periodicals.

Findings and Conclusions: Each teaching assignment has specific problems that may not parallel those in any other. Personal adjustment to local interpretation of philosophies must be accomplished in order to operate successfully within the local system. This adjustment must be made in the midst of actual operating conditions. The lack of experience on the part of a new teacher makes careful planning on his part mandatory. The problems of the new teacher may be resolved more easily through friendly cooperation with his colleagues and associates.

4118. MORGAN, LEO DONALD. ***An Investigation of the Relationship Between the Behavior of a Boy in School and His Home Life and Background.*** **M.A. 1957, University of Minnesota, 72 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To investigate the effect of home environment on a boy's behavior in the school and to obtain a measure of the effect of associations away from home upon his behavior.

Source of Data: A case study of a class of 21 boys at the Junior High School, Hopkins, Minnesota, with the cooperation of the entire teaching staff.

Findings and Conclusions: A student's behavior in school may depend on his home environment. If the home experiences are good and upstanding, the pupil has a better chance of being a good citizen; if the home life provides a poor environment, the possibility of a student's causing trouble increases. These statements are dependent upon the individual differences within each child.

4119. MORRIS, KENNETH JUDSON. ***Science Implications for Industrial Arts.*** **M.A. 1956, The Ohio State University, 125 p. L. (Columbus)**

Purpose of Study: To ascertain the role of industrial arts as a curriculum area in general education rather than an extension of manual arts by showing its value in the enrichment of science and to awaken the industrial arts profession to the prominent role of science in the technology.

Source of Data and Method of Study: The techniques used were mostly biographical, with a statistical method to show the impact of science on technology. An inventory was used to present the contents of typical science texts, and a philosophical approach was used to project implications of the study.

Findings and Conclusions: Industrial arts educators developing programs to reflect technology need to consider the worth of the physical sciences as a resource of technical information to many mechanisms and processes. Information taught in academic science classes should be exploited in the industrial arts laboratory. The scientific method of development and research should be reflected in modern industrial arts activities. Industrial arts teachers should encourage the construction of science apparatus and projects with a followup study to facilitate the implementation of such projects. Teacher educators should consider the physical sciences as requirements at the baccalaureate level.

4120. **MOWER, LEO L.** *Guidance Responsibilities of the Industrial Arts Teacher.* M.S. 1954, Utah State University, 80 p. L. (Logan)*

Purpose of Study: To ascertain the guidance responsibilities of industrial arts teachers and to find out how well these responsibilities are being carried out by the industrial arts teachers of Utah.

Source of Data: A thorough review of literature on teacher responsibilities in the guidance program and specifically those of industrial arts teachers; a questionnaire sent to the industrial arts teachers in Utah.

Findings and Conclusions: The guidance responsibilities of industrial arts teachers were classed under four headings, as: (1) a regular faculty member; (2) a teacher of industrial arts; (3) a counselor; and (4) a homeroom teacher. The study showed that the industrial arts teacher should seek closer cooperation with other faculty members. He should, whenever possible, have more industrial experience. More guidance work should be included in the homeroom program, and better record keeping is an essential part of the guidance program. Better shop libraries would assist in carrying out guidance responsibilities. Additional field trips could be used to advantage. Techniques to be used in applying for and in keeping a job should be taught. Additional occupational information could be included in class discussions. Exploratory experiences for industrial arts students could be improved. Better followup of students after they leave school should be provided.

4121. **MYERS, JOSEPH, JR.** *A Comparative Analysis of Guidance Programs and Worker Turnover.* M.S. 1958, The University of Michigan, 50 p. Education L. (Ann Arbor)

Purpose of Study: To determine the correlation between high school graduate worker turnover and guidance programs.

Source of Data: Doctors' theses, books, visits, and questionnaire sheets sent to all high schools in the Flint, Michigan, area to identify a high school with an organized guidance program and one with an unorganized guidance program. Graduates from the selected high schools were surveyed to ascertain how often and why they changed jobs.

Findings and Conclusions: No correlation existed between graduates of a high school with an organized program and graduates of a high school with an unorganized program with respect to the frequency of, or reason for, changing jobs. Adjustment to the methods and demands of a new job was the most difficult for a new employee; over 50 percent of the graduates indicated that teachers helped them the most to adjust to a new job. A sizable number of students indicated the lack of qualified teachers as the single item most deficient in the high school system to help the student adjust to a job.

4122. **NASHRALLAH, SAMUEL A.** *History of Adult and Vocational Education in Duval County (1908–1950).* M.A. 1956, University of Florida, 75 p. L. (Gainesville)

Purpose of Study: To investigate the trends, record the facts, and look into the past and present phases of vocational and adult education in Duval County, Florida.

Source of Data: The records of various agencies; the Florida Times Union, a Jacksonville newspaper; previous educational surveys; statistical records of the State department of vocational education; and materials received from pioneers in the field of education.

Findings and Conclusions: There is a need for a change of policy in the Duval County vocational education program. The need for vocational education is great, yet the public is not taking advantage of available facilities.

4123. **NELSON, ORVILLE WILLIAM.** *The Trends in Modern Wood Furniture Design, 1947-1957, With Implications for Teaching Design in Industrial Arts.* M.A. 1958, University of Minnesota, 92 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To find the trends in line, form, and construction in order to get a true view of the direction of modern design.

Source of Data: Leading design periodicals, books, and other pertinent writings in the area.

Findings and Conclusions: During the period studied, it was evident that modern design was affected by these factors: the designer's personality and training, the likes of the consumer, the interests of the manufacturer, and the wants of the distributor. There is no positive guide to design during the period studied.

4124. NELSON, WILLIAM GUSTAV. *A Follow-Up Study of 1946–1955 Graduates of Kansas State Teachers College, Emporia, With Twenty Hours or More in Industrial Arts.* M.S. 1957, Kansas State Teachers College, 54 p. L. (Emporia)

Purpose of Study: To obtain information on the location and status of graduates, to measure to some degree the effectiveness of the training they received, and to secure their suggestions for the improvement of industrial arts at K.S.T.C.

Source of Data: Questionnaires completed and returned by the graduates of Kansas State Teachers College who had earned 20 or more hours of credit in industrial arts.

Findings and Conclusions: Sixty percent of the teachers and 79 percent of the nonteachers were employed in the State of Kansas; 65 percent of the graduates were in the field of education and earned an average of $5,181.00 annually as compared to an average annual earning of $6,188.00 for the nonteachers.

4125. NEVALA, LEO RAYMOND. *A Proposed Plan of Audio-Visual Services for the Menomonie Public Schools.* M.S. 1958, Stout State College, 72 p. L. (Menomonie, Wis.)

Purpose of Study: To evaluate the audiovisual services of the Menomonie Public Schools, Menomonie, Wisconsin, and to propose a 5-year plan for a system-wide audiovisual program that will be in accord with latest trends and practices.

Source of Data and Method of Study: A status study was conducted with the aid of an interview guide. The normative survey method was employed to determine latest trends as suggested by acknowledged leaders and authorities in the field, and recommendations were made in accordance with that research.

Findings and Conclusions: Audiovisual practices in the Menomonie schools are not on a par with services currently suggested by authorities. The greatest deficiencies are: an organized program, leadership, and sufficient funds are not available; classrooms are inadequately equipped for audiovisual purposes; materials and equipment are not available in sufficient quantity or variety; consultation service and inservice training in the use of audiovisual materials are not available to the teachers; a student projectionists' club has not been organized; and few teachers are trained in the use of audiovisual materials and equipment.

4126. NICHOLS, CHARLES F. *Electrical and Electronic Devices. A Selected Group of Electric Projects for Industrial Arts Students in the Junior High School.* M.A. 1956, University of Minnesota, 118 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To provide a source of projects for electrical work and a basis for evaluating contemplated projects.

Source of Data: Eighth- and ninth-grade electrical classes at Jordan Junior High School in which students selected, built, and evaluated electrical devices. Devices included in the study were those most frequently receiving the highest rating.

Findings and Conclusions: Literature other than standard texts contain many useful and challenging project ideas; when neither source provides them, teachers and students must develop and build projects and activities.

4127. NICHOLS, CORYDON ORLANDO. *A Survey of College Entrance Requirements for Teachers of Industrial Arts.* M.A. 1958, University of Minnesota, 84 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To ascertain the entrance requirements of colleges training teachers of industrial arts in the areas of high school achievement, testing program, and their use of interview in the selection of applicants.

Source of Data: All known colleges and universities engaged in training teachers of industrial arts.

Findings and Conclusions: State laws prevented a majority of colleges from having selective admission practices. No standard method of selection was used. The most important single factor in determining eligibility was graduation from an accredited high school. Previous performance in high school was of primary concern to schools controlling admission. Shop training in high school had little effect on consideration for admission. Recruitment was a greater problem than selection. Test results were used for guidance and placement as frequently as for screening. The personal interview was considered more effective for determining certain factors pertinent to eligibility. The physical examination eliminated more applicants than any one or more other factors except high school achievement.

4128. NIEHAUS, LEVERN CHRIS. *Instructional Units in Industrial Arts*

Radio. M.A. 1955, San Diego State College, 103 p. L. (San Diego, Calif.)

Purpose of Study: To develop instructional units in industrial arts radio.

Source of Data: Books, periodicals, guides, courses of study and handbooks.

Findings and Conclusions: The instructional units attempted to provide resources which use an industrial arts "project approach" rather than a theory-experimental approach in teaching the subject matter.

4129. **NIXSON, FRANK DERRILL, JR.** *The History of the Department of Industrial Education at the Agricultural and Mechanical College of Texas from 1918 to Present.* M. Ed. 1956, Agricultural and Mechanical College of Texas, 91 p. Industrial Education L. (College Station)

Purpose of Study: To collect and assemble data concerning the history of the Industrial Education Department at the A & M College of Texas.

Source of Data: A survey of the catalogs, bulletins, brochures, and pamphlets of the A & M College and interviews with former faculty members.

Findings and Conclusions: The objectives, curriculum, and facilities of the Industrial Education Department have changed considerably since its beginning in 1919.

4130. **OGREN, HELMER HELARIUS, II.** *Objectives for a Proposed Drawing-Solid Geometry Course.* M.A. 1959, University of Minnesota, 188 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To investigate the feasibility of combining solid geometry with an industrial arts basic fundamentals course in drawing for college-bound high school students, to determine which parts of solid geometry could be covered in such a course, and to develop the objectives for an industrial arts course combining solid geometry with drawing fundamentals.

Source of Data: Current reports and articles published by mathematics study groups, textbooks, interviews with educators of authority, and courses of study prepared by the Minneapolis Public Schools Curriculum Committee.

Findings and Conclusions: It appears feasible and advantageous to teach much of the solid geometry now taught in a high school industrial arts course in a course on drawing fundamentals. It should be possible to cover in the drawing course enough solid geometry to be of real benefit to the college-bound student.

4131. **OHNMACHT, ALVIN E.** *A Study of Industrial Arts Teachers Teaching in Kansas During the School Year 1958–59.* M.S. 1959, Kansas State University, 100 p. L. (Manhattan)

Purpose of Study: To ascertain teachers' salaries, training, subjects taught and handling of shop finances in the State of Kansas.

Source of Data: A questionnaire and principals' organization reports from the State Department of Accreditation at Topeka, Kansas.

Findings and Conclusions: The salaries, degrees held, extra duties, and years of experience of all teachers were ascertained and recorded. A list of courses which industrial arts teachers felt should have been included in their training was also compiled. Methods of handling shop finances were also reported.

4132. **OLIVER, DANIEL RICHARD.** *The Problem of State Supervision of Industrial Arts in Kansas.* M.S. 1959, Kansas State College of Pittsburg, 109 p. Porter L. (Pittsburg)

Purpose of Study: To determine whether the existing conditions warrant employment of a full-time statewide supervisor for the industrial arts program in the State of Kansas.

Source of Data: Questionnaires to State education departments, industrial arts State supervisors and industrial arts teacher trainers.

Findings and Conclusions: The survey of 49 States revealed that 30.6 percent now have a full-time State supervisor for industrial arts. Among the States that did not have a full-time supervisor of industrial arts, it was found that the majority had a part-time supervisor of industrial arts operating through the supervisors of trade and industrial or vocational education.

The State of Kansas has no statewide supervision from either the trade and industrial or vocational field for the industrial arts program. Current needs and weaknesses in the Kansas industrial arts programs indicate that immediate attention should be given to securing a State supervisor for industrial arts education.

4133. **OSTER, JOHN ALBERT.** *A Handbook for Vocational Teachers of Trade and Industrial Subjects.* M.A. 1957, University of Minnesota, 141 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To ascertain the desirability of a handbook for vocational teachers of trade and industrial subjects and to select the most desirable style and content of such a handbook.

Source of Data: Handbooks, reports of workshops, master's papers, study guides and other pertinent literature in the field.

Findings and Conclusions: That a handbook for vocational teachers of trade and industrial subjects would be a great help. Part II of the paper is a handbook based on the findings as explained in part I.

4134. OTT, ELMER M. *A Survey of the Essential Industrial Educational Requirements for Employees of the Kansas Aircraft Industry and the Implications for the Industrial Arts Program Offered in the Kansas High Schools.* M.S. 1957, Kansas State Teachers College, 62 p. L. (Emporia)

Purpose of Study: To ascertain whether industrial arts courses offered in Kansas high schools are making the maximum contribution to the pre-employment training of workers.

Source of Data: Airframe producers and aircraft accessories and parts subcontractors in the State. The information was obtained through questionnaires and personal interviews.

Findings and Conclusions: The findings of the study seem to support the conclusion that increased emphasis is needed on blueprint reading, shop mathematics, use of measuring devices, metalworking, and mechanical drawing.

4135. PARSONS, GEORGE S. *A Course of Study in Machine Drawing Based on the Industrial Needs of the City of Kalamazoo.* M.A. 1941, The University of Michigan, 67 p. L. (Ann Arbor)

Purpose of Study: To reorganize the course of study in senior high school machine drawing for the Kalamazoo Public Schools, based on the industrial needs of the community as revealed in an occupational survey of the drafting profession.

Source of Data: A survey of the drafting practices in Kalamazoo.

Findings and Conclusions: The study resulted in a reorganization of the drawing program to make it more functional and practical.

4136. PATERNO, KENNETH DALE. *Preparation and Duties of Iowa Industrial Arts Teachers.* M.S. 1955, Iowa State College, 55 p. L. (Ames)*

Purpose of Study: To ascertain the preparation and duties of industrial arts teachers in Iowa and to compare the findings with those of similar studies conducted in Iowa in previous years.

Source of Data: The Iowa Educational Directory, Uniform Report of Teacher Qualifications, application for Iowa certificate, high school daily program cards and an analysis of college training.

Findings and Conclusions: Almost 75 percent of the industrial arts teachers have been in their present positions less than 5 years. There is a strong trend toward replacing teachers without college degrees with college graduates. There is also an increase in the number of full-time industrial arts teachers who majored in industrial arts in college. There has been a sharp decline in the percentage of teachers engaged in administrative work. The number of subjects taught in combination with industrial arts has declined, with physical education taught in combination most often and science, mathematics, and social science following.

4137. PATRICK, C. W. *A Survey of Current Practice in Allowing Credit Towards Apprenticeship for Full-Time Pre-Apprentice Training.* M.A. 1954, San Diego State College, 66 p. L. (San Diego, Calif.)

Purpose of Study: To ascertain current practices in allowing credit toward apprenticeship for pre-employment training in the skilled trades.

Source of Data: Questionnaires to joint apprentice committees and vocational supervisors and teachers and from official documents of the State depament of education.

Findings and Conclusions: Full-time vocational programs, designed originally as a substitute for apprenticeship, have tended, as the apprentice program has been revived and strengthened, to prepare youth to enter apprenticeship in the skilled trades.

4138. PATTERSON, ELAM PUSEY. *A Proposed Survey Course in Machine Shop Operation.* M.A. 1957, University of Florida, 68 p. L. (Gainesville)

Purpose of Study: To develop an integrated survey-type machine shop course to be taught in the Engineering Department at the University of Florida.

Source of Data: The two existing courses taught in machine shop plus additional material prepared and presented in a manner to be of greater interest and value to the student.

Findings and Conclusions: A course of study was developed which would allow for a variety of interests in the field of machine shop, where the student selects that portion of the offerings best suited to his needs and interests while acquiring an insight into the interests of his contemporaries in engineering.

4139. PAYNE, ROBERT FURMAN. ***A Study of the Organization and Administration of the Industrial Arts Program in the Junior High Schools in Fort Worth, Texas, With Emphasis Upon the Curriculum.*** **M.S. 1959, North Texas State College, 133 p. L. (Denton)**

Purpose of Study: To ascertain the curriculum pattern and the subject matter, and to make suggestions and recommendations based upon the findings of the study for improving organization and administration of the industrial arts program in the junior high schools of Fort Worth, Texas.

Source of Data: A questionnaire completed by industrial arts teachers in the junior high schools of Fort Worth, textbooks in the field, materials prepared by the Fort Worth schools, and interviews with administrators and teachers of the Fort Worth schools.

Findings and Conclusions: There were variations in class organization, class procedures, fees charged, and pupil requirements. Variations in curriculum selection were found in all areas of the industrial arts curriculum; less variation was found in the areas of mechanical drawing and crafts than in others.

4140. PENNELL, JOSEPH ELLIOTT. ***Industrial Arts in Lenoir, North Carolina.*** **M.A. 1956, The Ohio State University, 163 p. L. (Columbus)**

Purpose of Study: To develop a pilot program of industrial arts education to reflect technology for the city of Lenoir, N.C., and to include both the philosophical and physical phases from the elementary level to the adult level.

Source of Data: Personal conferences with local educators, architects, industrial leaders, and State and college officials.

Findings and Conclusions: Industrial arts facilities should be included in the regular classroom activities of the elementary school as well as separate facilities in the form of a practical arts laboratory for the whole elementary school with an industrial arts consultant employed to assist the teachers. The senior high facilities will have to be improved in some areas. The program should involve manufacturing, construction, industrial drawing and design, graphic and electrical communications, power and mechanics, advanced industrial studies, handicrafts, foremanship training, and diversified occupations and should be taught by two industrial arts teachers and one diversified occupations teacher. A critical evaluation of the program will be made each year.

4141. PETERSEN, MOLEN LARRY. ***Auto Service Instruction for the Educational Needs, Interests, and Desires of American Youth.*** **M.S. 1957, Utah State University, 154 p. L. (Logan)***

Purpose of Study: To prepare a course of study which may supplement the present automotive programs in the high schools and to determine the objectives to be used in the preparation of the course of study.

Source of Data: 73 questionnaires distributed to the following types of business houses in Logan, Utah: dealership owners, shop foremen, mechanics automotive parts men, service station attendants, and automotive salesmen.

Findings and Conclusions: The questionnaire used in this study was based upon the results of a doctoral dissertation done at University of Missouri in which one of the purposes was to furnish data upon which school authorities might organize automotive instruction in high school and in adult education programs. Results from the questionnaires used in the present study confirmed the results of the Missouri study concerning the educational needs of people in relation to the selection, operation, and care of automobiles. A course in automotive consumer education was prepared from data secured; teaching units were of two kinds: information assignment sheets and job assignment sheets.

4142. PETERSON, MELVIN ROY. ***A Teaching Guide for Industrial Arts in the Logan Junior High School, La Crosse, Wisconsin.*** **M.A. 1956, University of Minnesota, 197 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To prepare a teaching guide that would aid the teacher in making industrial arts more meaningful to the students of Logan Junior High School, La Crosse, Wisconsin.

Source of Data and Method of Study: A teaching guide for the seventh, eighth, and ninth-grade program was constructed. Included in the teaching guide were the following: a short historical review of industrial arts, historical trends of industrial arts in La Crosse, Wisconsin, general objectives of industrial arts, and 34 complete instructional units.

Findings and Conclusions: A review of literature concerning industrial arts history, objectives of industrial arts, courses of study, and evaluation appear to be necessary in developing an effective teaching guide.

4143. PHILPOTT, KENNETH GORDON. ***Practices of Discussing Labor-Management Relations in High School Industrial Education Classes.*** **M.A. 1958, Northeast Missouri State Teachers College, 78 p. L. (Kirksville)**

Purpose of Study: To investigate the practice of discussing the problem of labor-management relations in industrial education classes of selected high schools in Missouri.

Source of Data: Questionnaires sent to a selected group of industrial education teachers (vocational industrial and industrial arts) and a selected group of leaders in the field of industrial education, management, and organized labor.

Findings and Conclusions: Eighty-one percent of the responding teachers believed labor-management relations should be discussed in high school industrial education classes; less than one-half of this group actually included such discussion in their classes, the majority of those who did being in vocational industrial education. There seems to be general agreement among the representatives of management, organized labor, leaders in industrial education, and high school industrial education teachers as to what labor-management relations should be discussed. Topics generally considered important were: Aims of labor movement, advantages and disadvantages of union membership, effects of unions on society, current labor problems, and labor legislation. Industrial education teachers tend to use the publications of management more than they do the publications of organized labor.

4144. PIERCE, GUY and RUSSELL, LESTER FRANK. ***Learning Activities for Use in Industrial Arts Classes at the Junior High School Level.*** **M.A. 1956, University of Minnesota, 125 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To suggest, on the basis of the ability, level, and characteristics of junior high students and the objectives of industrial arts, activities which will aid learners in achieving the desired goals.

Source of Data: Textbooks, periodicals, newspapers, and industrial literature.

Findings and Conclusions: The study was a presentation of a broad list of learning activities suitable for use in junior high school industrial arts classes.

4145. PRAHL, EDWARD ARTHUR. ***Status of Graphic Arts Education in Wisconsin Public Secondary Schools: 1955–56.*** **M.S. 1956, Stout State College, 77 p. L. (Menomonie, Wis.)**

Purpose of Study: To ascertain the current offerings in graphic arts in the public secondary schools of Wisconsin.

Source of Data: A questionnaire sent to the public secondary schools of Wisconsin.

Findings and Conclusions: Less than 10 percent of the schools offer graphic arts. Most courses in graphic arts emphasize letterpress over all other areas. Almost all instructors hold at least the bachelor's degree; many have engaged in advanced study; about half have had trade experience.

4146. PRESTON, RAYMOND C. ***An Analysis of the United States Air Force Primary-Basic Navigator Flying Training Program.*** **M.A. 1960, University of Minnesota, 271 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To analyze the present navigator flying training program of the U.S. Air Force and to propose a new program for training navigators that should prove to be more effective than the present program.

Source of Data: Current publications of the U.S. Air Force concerning the primary-basic navigator flying training program. The recommendations proposed in the study were based on the writer's observations as a navigation instructor at Harlingen Air Force Base, Texas.

Findings and Conclusions: The primary-basic navigator flying training program of the U.S. Air Force could be improved by revising flight mission requirements, flight mission grade sheets and by proposing new criteria for evaluating the successful completion of a flight mission.

4147. PRICHARD, NEAL WAYNE. ***Home Study Related Training, The Vocational Home Study Related Training Program for Apprentices***

and Veterans. M.A. 1958, University of Minnesota, 88 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To provide a detailed report of vocational home study related training programs which may assist other State-related training program.

Source of Data and Method of Study: Current publications and the historical records from the Minnesota program were reviewed. Personnel from the Minnesota department of education were contacted, and the related training programs developed by the writer were described.

Findings and Conclusions: The field of home study for related training should be studied further. Evidence indicates the program can successfully provide related training for isolated trainees.

4148. QUAST, ROBERT E. *A Study of the Local Industrial Resources, Their Availability and Extent of Use in the Teaching of Industrial Arts in the Dallas Independent School District, Dallas, Texas.* M.S. 1957, North Texas State College, 142 p. L. (Denton)

Purpose of Study: To study the local industrial resources, to ascertain the availability of industrial resources for instructional enrichment of industrial arts, to determine the extent of use of available industrial resources in teaching industrial arts, and to make recommendations based upon findings of the study.

Source of Data: Personal interviews with local industrial arts teachers, managerial staffs of manufacturers, manufacturers' representatives, and publications of the Dallas Chamber of Commerce and the Texas Employment Commission.

Findings and Conclusions: The findings indicate that the local industries in Dallas, Texas, will cooperate in enriching the educational program by making their plants available for visits by students and teachers, and by providing literature, sample products, and human resources. The Dallas Independent School District tends to discourage field trips by placing a maximum of 90 minutes on each and limiting the number of field trips to 2 per semester. Only 5 of the 47 industrial arts teachers questioned had taken industrial arts students to visit local industry. However, 39 of the same teachers reported they had visited industry seeking various types of information.

4149. RAHN, HENRY IRWIN, Jr. *A Survey of the Tri-Cities to Determine the Vocational Industrial Needs.* M.I.A. 1958, North Carolina State College, 114 p. L. (Raleigh)

Purpose of Study: To analyze the job opportunities and vocational training needs in the business and industrial establishments and the occupational plans of high school students in Leaksville, Spray, and Draper, N.C., to determine an adequate program of vocational industrial education.

Source of Data: Personal interviews, questionnaires, letters, and U.S. census reports. Comparisons were made of industry's needs with skilled worker supply and the occupational plans of high school students. The effectiveness of the present educational program was analyzed.

Findings and Conclusions: In view of the employers' interest in having the school provide job training, the inadequate training provided for beginning workers, and the scarcity of qualified workers in several important occupations, it was concluded that the school should provide a sound program of vocational industrial education. Recommendations were made for a suitable program of vocational guidance, on-the-job training, trade and industrial education, and industrial arts.

4150. RALPHS, LEE W. *An Evaluation of Necessary Elements for Desirable Industrial Arts Instruction in the Elementary Schools of Utah.* M.S. 1951, Utah State University, 67 p. L. (Logan)*

Purpose of Study: To procure and evaluate the opinions of industrial arts authorities and Utah school administrators on the necessary elements for desirable industrial arts instruction in the elementary school.

Source of Data and Method of Study: The opinions of industrial arts authorities were used to develop four plans of instruction. These were presented in questionnaire form to Utah administrators to indicate their preference or opposition.

Findings and Conclusions: Under existing conditions an average of 64 percent favored the plan where the regular teacher handles instruction of all subjects, including industrial arts. Under "ideal" conditions approximately 40 percent favored the services of a specialist and 38 percent the use of the regular teacher; the platoon system was opposed by 67 percent; practically all felt that industrial arts should be a part of the elementary curriculum for both boys and girls. The majority of the administrators favored the regular-teacher plan, whereas the majority of industrial arts teachers favored the specialist teacher.

4151. **RAMEY, WALTER SCOTT.** *Usefulness of the Lee-Thorpe Occupational Interest Inventory for Predicting Achievement and Choice of Core Areas in Des Moines Technical School.* M.S. 1955, Iowa State College, 39 p. L. (Ames)

Purpose of Study: To ascertain whether achievement and the selection of core areas can be predicted from the relationship of raw scores made on a battery of tests and the senior core area average mark.

Source of Data: The American Council on Education, Minnesota Paper Form Board, and Lee-Thorpe Occupation Interest Inventory, which were administered to students of the Des Moines Technical High School.

Findings and Conclusions: Four of the variables produced significant t-scores differentiating the groups or core areas. The loss of the computational interest variable did not affect the efficiency of the prediction equation.

4152. **RANDALL, A. KENT.** *Determining the Extent, in Terms of Behavior Growth, to Which Industrial Arts Teachers in Utah Are Achieving the Objectives of Industrial Arts.* M.S. 1954, Utah State University, 62 p. L. (Logan)*

Purpose of Study: To ascertain the degree to which the objectives of industrial arts are being achieved in Utah in terms of desired behavior growth and the activities that contribute most to the program, in the opinion of industrial arts teachers.

Source of Data and Method of Study: A questionnaire was used in gathering the data. A followup letter was sent to insure a better return. Each teacher was to indicate the degree or extent to which the activity was carried out in his school and the importance of the activity in his judgment. The list of objectives given by the American Vocational Association was used in the study.

Findings and Conclusions: Three objectives "habit of orderly performance," "shop skills and knowledge," and "health and safety," were emphasized more than others in Utah schools. All nine activities related to the "habit of orderly performance" objective are included in 50 percent or more of the shop programs. Teachers include 7 of 8 activities pertaining to "shop skills and knowledge" in at least 50 percent of their programs, and 10 out of 12 activities relating to the objective "health and safety." "Interest in industry," "interest in achievement," and "cooperative attitudes" receive median attention, while the "self-realization and initiative," "appreciation and use," and "drawings and design" objectives receive the least emphasis.

4153. **RANDLEMAN, ROBERT RONALD.** *The Arts Program—The Development and Current Status of the Arts Program at the University of Minnesota Laboratory High School and at Other Selected Schools.* M.A. 1956, University of Minnesota, 222 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To determine the developmental pattern of the arts program at the University of Minnesota Laboratory High School and to define that program as presented in 1955–56, to obtain descriptions of comparable programs at other schools, and to specify recommendations for further development of the arts program based upon recognized problems and trends.

Source of Date: Appropriate published literature, the administrator's files at the laboratory school, and the personal files of individuals previously connected with the program. A questionnaire was used to elicit descriptions of 19 similar programs. A descriptive nonstatistical method was applied to the study.

Findings and Conclusions: The findings present a description of and conclusions concerning the development and status of the arts program in the University of Minnesota Laboratory School.

4154. **RAUCH, VIRGIL ANDREW.** *A Study of the Need for an Adult Welding Class in the Small Community.* M.A. 1958, University of Minnesota, 47 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To investigate the need for welding classes in small communities; how they are promoted, financed, and handled; their success and attendance.

Source of Data: A questionnaire sent to random selected schools and a review of welding literature.

Findings and Conclusions: Of the schools that already have adult welding classes, 98 percent report them successful. Many schools which do not have such classes report a demand for them. Almost all schools are short on equipment and have two or more students per unit of equipment. Many instructors recommend small classes and short courses. Most schools hold classes in the winter months.

4155. RECKIN, GERALD EUGENE. *A Follow-up Study of San Diego State College Graduates of Industrial Arts 1951 Through 1956.* M.A. 1957, San Diego State College, 138 p. L. (San Diego, Calif.)

Purpose of Study: To evaluate the curriculum offered at San Diego State College in industrial arts in terms of the opinions and success of its graduates in industrial arts and to make recommendations for possible improvements.

Source of Data: Books; publications of the government and learned societies; periodicals; and unpublished materials.

Findings and Conclusions: The young department of industrial arts at San Diego State College is successful in training men to become successful teachers.

4156. RESIDES, GEORGE H. *Organization and Administration of Shop Courses for Trade and Industrial Teachers.* M.S. 1931, The Pennsylvania State University, 43 p. L. (University Park)

Purpose of Study: To organize a series of shop courses and make recommendations in regard to shop electives for students who are preparing to become industrial educators at Pennsylvania State College.

Source of Data: Conferences and interviews were had with the various instructors who taught the several shop courses. A tentative outline was made of projects, the sequence of the operations, and the time distribution for the various projects. The writer then reorganized the material and submitted it to the instructors for final approval.

Findings and Conclusions: The several outlines of courses.

4157. RICE, CHARLES MASON MACDOUGALL. *Design As Applied to Its Uses in Industrial Arts.* M.A. 1939, Washington State College, 165 p. L. (Pullman)

Purpose of Study: To analyze the historical and psychological development and application of design principles in teaching industrial arts.

Source of Data: Library research, catalogs, observation of historic and contemporary objects, and personal experience.

Findings and Conclusions: The development of appropriate designs in the field of industrial arts may be divided into procedural steps for instructional purposes. The instructor should build a library of instructional materials concerning design which may be used to develop a background for the appreciation of good design.

4158. ROBLEY, ASA AUSTIN. *Usefulness of High School Mathematics and Science in Predicting First-Quarter Achievement of Engineering Freshmen at Iowa State College.* M.S. 1957, Iowa State College, 32 p. L. (Ames)

Purpose of Study: To investigate the usefulness of high school mathematics and science credits in predicting first-quarter scholastic achievement for engineering freshmen at Iowa State College.

Source of Data and Method of Study: A sample of 956 members was taken from the class which entered Iowa State College, in the fall of 1956. An analysis of covariance was used to test the significance of the effect of four different stratifications of the sample, which were designated the algebra emphasis, the geometry-trigonometry emphasis, the chemistry-physics emphasis, and the fully qualified mathematics-science emphasis.

Findings and Conclusions: The number of credits in high school mathematics and science which a student presents at college matriculation will give a significant indication of his probable scholastic achievement in his first quarter as an engineering freshman. In any plan of student selection in an engineering college, serious consideration should be given to the number of semesters of high school mathematics and science presented by applicants for admission.

4159. ROWLAND, FRED K. *A National Survey of Industrial Arts in the Elementary Schools.* M.S. 1954, Utah State University, 63 p. L. (Logan)*

Purpose of Study: To aid local school personnel in preparing a program of industrial arts for the elementary schools based upon information received from authorities on a national level, in order that youth might better understand industrialized society and live more effectively in it.

Source of Data: Literature dealing with various aspects of the elementary level of industrial arts. In addition, elementary school teachers and authorities in industrial arts and elementary school programs were surveyed by questionnaire to obtain their views on the subject.

Findings and Conclusions: In the elementary school, industrial arts experiences are an integral part of the curriculum. Some leaders feel the program should exist in all grades. There are differences of opinion as to whether or not industrial arts on an elementary level should be taught by the regular elementary school teacher or by a teacher specially trained in industrial arts.

4160. ROY, MANINDRA NATH. *An Exploratory Investigation of the Objective Type Testing Methods of the United States of America with Implications for the Use of Such Tests in India.* M.A. 1957, University of Minnesota, 126 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To gain a first-hand knowledge of the educational system of America and the measurement techniques applied in this system in order to apply similar methods in the development of the educational system in India.

Source of Data: Documents and literature dealing with subject matter and visits to various institutions in and around Minneapolis.

Findings and Conclusions: The changed conception of education and educational measurement takes into consideration the development of the individual more than the traditional system. The better results are apparent and should be applied in India, too, for making the educational program more effective.

4161. RUBLIN, WILLARD GORDON. *Methods of Issuing and Accounting for Supplies in Industrial Arts Shops in Washington.* M.S. 1956, Oregon State College, 84 p. L. (Corvallis)

Purpose of Study: To ascertain the most efficient means of issuing and accounting for supplies in industrial arts shops in Washington.

Source of Data: Questionnaires distributed to 143 secondary schools of Washington.

Findings and Conclusions: Over 50 percent of the teachers handle shop money. Supplies should be handled by student officers, with financial accounts controlled by the school office. The assistance of the purchasing agent is needed and a shop budget is desirable, although many teachers operate without one. The shop teacher should maintain business accounts for the shop.

4162. RUBSAM, PIERRE FERDINAND. *An Overview of Audio-Visual Materials for Industrial Arts Education in San Diego County.* M.A. 1956, San Diego State College, 174 p. L. (San Diego, Calif.)

Purpose of Study: To give the teachers in San Diego County an overview of (1) availability of the types of audiovisual materials in the city and county, (2) audiovisual materials they can request for use to enrich their instruction, and (3) the use of audiovisual materials in the classroom for related and technical information in industrial arts education.

Source of Data: Literature pertinent to the study.

Findings and Conclusions: Industrial arts teachers in San Diego City and County are so limited in time that their use of audiovisual materials has been curtailed to a few motion pictures or filmstrips. Certain portions of this study, if made available to the industrial arts teachers included in the study, would enable the teachers to make greater use of audiovisual materials.

4163. RUSSELL, LESTER FRANK and PIERCE, GUY. *Learning Activities for Use in Industrial Arts Classes at the Junior High School Level.* M.A. 1956, University of Minnesota, 125 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To suggest, on the basis of the ability, level, and characteristics of junior high students and the objectives of industrial arts, numerous activities in the various areas which will aid students in achieving the desired goals.

Source of Data: Textbooks, periodicals, newspapers, and industrial literature.

Findings and Conclusions: The study was a presentation of a broad list of activities suitable for junior high school industrial arts classes.

4164. SADECKY, RUDOLPH L. *A Study of the Philosophy of William Torrey Harris and His Contributions to Industrial Arts.* M.S. 1955, North Texas State College, 116 p. L. (Denton)

Purpose of Study: To ascertain the philosophical contribution to the field of education by William Torrey Harris as set forth in his contribution to industrial arts.

Source of Data: Library books and abstracts from U.S. Office of Education publications, journals of education, proceedings of educational societies, journals of philosophy, official reports, correspondence, addresses, and essays.

Findings and Conclusions: William Torrey Harris was instrumental in influencing superintendents of school systems in accepting manual training as an integral part of the public school curriculum. The philosophy of Harris contributed greatly in the acceptance of industrial arts as general education.

4165. SANDERS, LEROY JOHN. *Power and Transportation as Applied to Industrial Education on the College Level.* M.S. 1959, Northern State

Teachers College, 63 p. L. (Aberdeen, S. Dak.)

Purpose of Study: To determine subject matter and laboratory assignments for power and transportation.

Source of Data: A questionnaire from selected American colleges and universities.

Findings and Conclusions: Power and transportation subject matter and laboratory assignments would include those broad areas covered by automotive mechanics, power mechanics, and transportation; courses in aviation, aero-technology, and aero-mechanics might also be included.

4166. SCHLEUSENER, ROLAND, EDWARD. *Industrial Arts in the Lutheran High Schools.* M.A. 1959, University of Minnesota, 83 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To investigate the general objectives of the private school and the Lutheran school, determine the objectives of the industrial arts programs, establish industrial arts course offerings and program development, explore the extent of student participation in these programs, study methods used to enroll students in industrial arts programs, and investigate school policies concerning industrial arts.

Source of Data: A questionnaire sent to 15 Lutheran high schools; selected literature reviewed to define the objectives of the present Lutheran and public high schools.

Findings and Conclusions: The industrial arts program in the Lutheran schools used the same basic objectives as those used by public and private schools. Most of the schools offered one shop, usually woodworking or mechanical drawing. Although Lutheran schools usually did not follow the recommendations of State departments of education recommending the general-shop type of program, one school used it with good results. Enrollments were adequate wherever the course was offered. Many schools were planning to increase the size of their departments and their offerings in new buildings. Industrial arts seemed to be well accepted by the leaders of the schools.

4167. SCHMELZER, KENNETH. *A Survey to Determine the Status of Woodfinishing in the Industrial Arts Curriculum in the High Schools of the State of Washington.* M.S. 1958, State College of Washington, 63 p. L. (Pullman)

Purpose of Study: To ascertain methods and procedures being used in finishing projects in high school woodwork classes in Washington and to ascertain the wood finishing methods and techniques taught by teacher training institutions and the improvements that can be made to improve the training of industrial arts teachers in wood finishing.

Source of Data: 82 questionnaires filled out by high school woodworking teachers and questionnaires answered by 6 teacher training institutions in the State of Washington that offer a degree in industrial arts education. Results were based on percentages of respondents indicating instructional content, finishing materials used, and methods of application employed.

Findings and Conclusions: The field of wood-finishing should be analyzed by teacher training institutions for appropriateness of use in the school shop. A more exhaustive study of modern finishes should be made, and the teacher should select finishing methods on the basis of difficulty for the student and suitability to the facilities available. A general upgrading of high school woodfinishing facilities is needed and a careful analysis of the needs of the woodworking teachers should be made by the teacher training institutions.

4168. SCHROEDER, EDWARD AUGUST. *A Comparison of Two Methods of Teaching Industrial Arts Drawing in the Chatham Junior High School, Savannah, Georgia.* M.I.A. 1956, North Carolina State College of Agriculture and Engineering, 69 p. L. (Raleigh)

Purpose of Study: To give the teacher of industrial arts drawing a better method of teaching drawing to eighth-grade boys in keeping with their level of ability and present-day thinking.

Source of Data and Method of Study: Data were secured by the equating of two groups of eighth-grade boys on the basis of IQ, grade placement, chronological age, an algebra aptitude test, and a pretest. Additional data were secured from a posttest and from two series of 10 drawing plates. A series of familiar problems, known as procedure A, was taught to an experimental group and a series of abstract problems, procedure B, was taught to a control group. Two teaching methods were used in the presentation of subject matter.

Findings and Conclusions: There was very little difference in the effectiveness of the two teaching methods as measured by factual knowledge. There was no significant difference between the scores of the drawing plates of both groups. Significant differences were found in the gain in factual knowledge, as measured by the pretests and posttests for both groups. The behavior of the students was better in the experimental group than in the control group. The slow learner in the control group, on the average, turned in more work than the corresponding slow learner in the experimental group. The superior students in the control group, on an average, turned in more work than the corresponding superior student in the experimental group. The grades established for work habits indicated the experimental group was superior to the control group. Students in the experimental group made higher final grades than in the control group.

4169. SEITZ, ROY W., and MEIXNER, G. HAROLD. ***General Information for Metalwork in Junior High School Industrial Arts.*** **M.A. 1958, University of Minnesota, 210 p. Department of Industrial Education (Minneapolis)**

See Meixner, G. Harold.

4170. SEPT, EAFTON B. ***The Industrial Arts Program in the Schools of Idaho.*** **M.S. 1957, Utah State University, 51 p. L. (Logan)***

Purpose of Study: To ascertain the present status of the industrial arts programs in the State of Idaho, and the trends of industrial arts in Idaho compared to the trends shown by current publications in the field.

Source of Data: Questionnaires sent to one industrial arts teacher of each high school and junior high school that had a program in operation in the State of Idaho.

Findings and Conclusions: Although industrial arts programs have existed in Idaho at least since 1912, the State still has no organized administration or supervision program for industrial arts, although efforts in this direction are being made. The number of school districts, having small enrollments, has been a major problem in the development of industrial arts programs. Many of the industrial arts programs are taught by teachers who do not have adequate training in industrial arts. Many administrators expressed a desire to continue the programs as they are now. A general-type shop is recommended for existing programs, and it is also recommended that new programs be established.

4171. SESSIONS, FOSS B. ***An Analysis of the Automotive Program at Ricks College in Relation To Its Meeting the Needs of the Students.*** **M.S. 1959, Utah State University, 67 p. L. (Logan)**

Purposes of Study: To trace the development of the automotive program at Ricks College. To analyze the automotive curriculum as to its effectiveness in meeting the employment needs of students. To analyze the automotive curriculum as to its effectiveness in preparing students for higher education. To compare the automotive program at Ricks College with the automotive program at Utah State University.

Source of Data and Method of Study: Personal interview with garage owners in the area served by the school and a questionnaire sent to students who had completed the automotive program at Ricks College. The results of the study were presented by an analysis of each of the nine questions used in the interview. The history of the Ricks automotive program was obtained by a study of the college history and from the available college bulletins. The present program and the automotive program at Utah State University were obtained from the college and university bulletins.

Findings and Conclusions: The increase in support of local business firms and student enrollment plus the technological advances in industry and an enthusiastic attitude on the part of the faculty and administration all indicate a promising future for the Ricks College automotive program. The comments and responses of garage owners indicated a willingness to support the program and to hire students in mechanics. The students indicated a definite need for more and better training in the automotive field.

4172. SETALA, ARNE W. ***Action Research for Trade and Industrial Education.*** **M.A. 1957, University of Minnesota, 86 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To investigate the need for increasing the emphasis on research in trade and industrial education with special attention given to action research as a method.

Source of Data: A review of current literature on action research.

Findings and Conclusions: There is a great need for increasing research in trade and industrial education. Action research is one of the methods that will help to accomplish this objective. The study reviews the background of action research, describes the steps of the process, outlines the positive and negative factors which must be considered, discusses the dynamics of effective group participation, and presents some hypothetical examples of action research in trade and industrial education.

4173. SHARP, J. CECIL. ***Certain Needs of the Refrigeration Industry As They Relate to Content of Refrigeration Courses.*** **M.S. 1951, Utah State University, 106 p. L. (Logan)***

Purposes of Study: To ascertain the needs of retail establishments selling commercial refrigeration units and problems connected with servicing, installation, etc., as they relate to education. To investigate education programs in refrigeration and to find out if these programs are meeting the needs of industry.

Source of Data: Published and unpublished studies; personal comments on the literature; school catalogs; questionnaires sent to refrigeration service men, to associate members of the Refrigeration Service Engineers Society, and to universities and colleges.

Findings and Conclusions: A basic inventory of service calls, types of equipment worked on, refrigerants used, and normally encountered servicing difficulties is presented. Refrigeration service-and-sales organizations are usually small and serve local trade; large jobs which may be encountered are cooperatively shared with the manufacturer whom the small businessman represents.

Refrigeration apparently will continue to expand in the future. Small organizations to be successful must have personnel who have mechanical ability, technical knowledge, and managerial and administrative skill. Few students planning to enter the business of selling and servicing refrigeration equipment enroll in engineering programs in school.

Technical institute-type training programs aim primarily at developing technological and manual skill, with minor attention paid to business principles but little attention given to managerial and administrative skills or to psychological background.

4174. SHAW, BERNACE L. *Emphasis Placed Upon the Unique Objectives of Industrial Arts at Byrd and Fair Park High Schools.* M.S. 1959, Northwestern State College, 101 p. Russell L. (Natchitoches, La.)

Purpose of Study: To ascertain the unique objectives of industrial arts in the opinion of 47 experts in the field and the emphasis placed upon these objectives in the opinion of 220 former industrial arts students at Byrd and Fair Park High Schools, Shreveport, La.

Source of Data and Method of Study: Related studies were reviewed; the objectives used as a basis for this study were obtained from the American Vocational Association publication, *A Guide to Improving Instruction in Industrial Arts.* Data were obtained by questionnaires accompanied by a letter of explanation. The questionnaires sent to the experts were more general than the ones sent to the students, although both questionnaires presented the same objectives.

Findings and Conclusions: Returns from the experts indicated that no one objective is entirely unique to industrial arts; however, they were in general agreement as to four of the objectives being most unique to industrial arts, namely; Shop Skills and Knowledge, Drawing and Design, Interest in Industry, and Appreciation and Use. The former industrial arts students were somewhat in disagreement with the experts. The students reported that the objectives Health and Safety, Appreciation and Use, Orderly Performance, and Drawing and Design had been emphasized "much" at Byrd and Fair Park High Schools. The two objectives "Health and Safety" and "Orderly Performance," as stated, could be realized equally well in other general education courses in the opinions of the experts. Thus for these two objectives to be unique, they must be stated in direct regard to industrial arts.

4175. SHAW, G. MERRILL. *The Design of a Universal Projection Drawing Model and Its Application in Teaching Projection Drawing.* M.S. 1951, Utah State University, 86 p. L. (Logan)*

Purpose of Study: To develop a means whereby the student may be aided in studying many of the basic principles in several difficult areas of projection drawing, thereby adding to the proficiency of drafting instruction.

Source of Data: A review of the literature to identify devices used in teaching orthographic projection and to develop a universal model through a process of reflective study, experimentation, and use of various projection devices in classes.

Findings and Conclusions: It is possible to illustrate the principal planes of projection with a single teaching aid, the *Universal Projection Drawing Device* developed in this study. Although there is wide divergence of opinion among authorities on basic terminology relative to projection drawing, the terminology used in this study may be considered acceptable. Little has been done to develop teaching aids that will illustrate auxiliary and oblique planes of projection. Previous studies have proved that the use of models is desirable for teaching drafting. The *Universal Projection Drawing Device* has resulted in an improved method of presenting and studying drawing problems. It is truly a universal device because of its many applications to the field of projection drawing.

4176. SHELBURNE, DARRELL WINSTON. *A Survey of Audio-Visual Materials for Woodworking.* M.A. 1958, San Diego State College, 109 p. L. (San Diego, Calif.)

Purpose of Study: To ascertain the availability of the audiovisual materials related to woodworking, to organize the list under suitable headings, and to indicate what agency has the material available and how it may be obtained.

Source of Data: Books, unpublished materials, and other pertinent literature in the field. A survey was made to ascertain the types of audiovisual materials available for woodworking.

Findings and Conclusions: A concise and simplified listing of audiovisual materials for use in woodworking are presented. It should be kept up to date with periodic surveys listing the new materials as they become available.

4177. SHERICK, ALBERT MARLIN. *Factors Affecting the Amount of Cold Liquid Hide Glue Used in Industrial Arts Shops.* M.S. 1955, Iowa State College, 66 p. L. (Ames)*

Purpose of Study: To ascertain the effect of open assembly time and the number of sides glued on the strength of glue joints made with cold liquid hide glue.

Source of Data and Method of Study: Data were obtained by gluing five species of wood and testing each of them to destruction.

Findings and Conclusions: The strongest joints occurred at the 10-minute open assembly time with glue applied to both sides of the joints. White pine produced the strongest joint with 5-minute open assembly time glue applied to both sides of the joint. Walnut produced its strongest joint with a 5-minute open assembly with glue applied to only one side of the joint.

4178. SINCLAIR, JOHN ARWOOD. *Coordination of Industrial Arts and Agriculture Farm Shop Work in Class "C" and "D" Secondary Schools in Michigan.* M.A. 1957, Western Michigan University, 37 p. L. (Kalamazoo)

Purpose of Study: To investigate (1) the possibility of the same person's teaching both agriculture farm shop and industrial arts shop, (2) the advisability of having two teachers use the same shop facilities, and (3) whether class "C" and "D" schools should have separate shop facilities for farm shop and for industrial arts shop work.

Source of Data: Questionnaires sent to 123 class "C" and "D" (smaller) high schools in Michigan involving 99 superintendents, 80 agriculture teachers, and 83 industrial arts teachers.

Findings and Conclusions: School administrators were about equally divided on the question of having one shop teacher handle both farm shop and industrial arts classes. A majority of the agriculture teachers opposed the idea, while a majority of the industrial arts teachers favored the idea. Separate shop facilities for industrial arts and for farm shop work was favored by a majority of the respondents.

Approximately 25 percent of the industrial arts teachers and 10 percent of the agriculture teachers studied were teaching both types of shop programs. Opportunity should be provided for training teachers for these dual programs.

4179. SKINNER, HALVER MORGAN. *An Evaluation of the Industrial Arts Program of Montana Secondary Schools.* M.S. 1959, Utah State University, 105 p. L. (Logan)

Purpose of Study: To evaluate the industrial arts program in certain selected secondary schools in Montana.

Source of Data and Method of Study: Personal visits to the selected schools and an evaluation of the program using the 1950 edition of "Evaluative Criteria," Industrial Arts Section, of the Cooperative Study of Secondary Schools. A trial run was made in two schools to find out the most effective way of using the instrument. As a result it was decided to use only units II and III of the Criteria. The selected schools also made their own evaluation.

Findings and Conclusions: School administrators and industrial arts teachers in the selected schools in general did not accept as a part of their philosophy the basic "needs of youth" as set forth in the Criteria. Few of the administrators have a sound philosophy of industrial arts as an integral part of education. Only 20 percent of the schools require students to take industrial arts courses, and only 20 percent of the schools allowed girls to take industrial arts. Woodwork and mechanical drawing were the subjects offered most often. An average of only 4.8 instruction units was offered in the industrial arts departments. The quality and quantity of material used in instruction and project work was good. Storage space in the shops was generally inadequate. Generally, the shops were too small to meet student needs. The instructional staff as a whole showed weakness in professional training; teachers in large schools were better prepared than those in the smaller schools. On the whole, much of the teaching lacked some of the desirable characteristics of the project method, motivation, thrill in producing some article with utility, satisfaction of planning, and an intimate acquaintance with various kinds of materials. An overall evaluation showed considerable need for improvement.

4180. SKIRVIN, EMMETT E., Jr. *A History of the Deveolpment of Industrial Arts at San Diego State College From 1902 to 1953.* M.A.

1953, San Diego State College, 88 p. L. (San Diego, Calif.)

Purpose of Study: To ascertain, in logical sequence, the historical events that have led to the present industrial arts program at San Diego State College.

Source of Data: Available literature pertinent to the study.

Findings and Conclusions: The history covers the development of industrial arts at San Diego State College from 1902 to its present status.

4181. SLAUGH, OWEN. *A Study-Guide for a Unified College Course in Automotive Electricity (And Indications of State Acceptability).* M.S. 1957, Utah State University, 151 p. L. (Logan)*

Purpose of Study: To develop a series of study guides to coordinate what is being taught in college automotive courses involving transferable credit. To develop a study guide valuable enough to a teacher to insure adoption through desire rather than persuasion.

Source of Data and Method of Study: Modern textbooks, a number of special publications, engineering reports, and factory school notes were used to form a library of source material. A list of 500 of the most essential objectives for a course in automotives was compiled. An appropriate examination question was developed for each objective, and a master index was compiled. A ranking was made of the master index based upon the number of pages of text devoted to each question. A questionnaire was developed from the studyguide material and sent to instructors and directors for study and rating.

Findings and Conclusions: The data revealed wide variations in course content, also a definite willingness to cooperate in adopting a unified course. The plans for unification met with approval. The study guide was to be used as the basis for the course.

4182. SMITH, ALBERT EDWARD. *A Survey of Representative Woodworking Equipment in the California Senior High Schools.* M.A. 1955, San Diego State College, 131 p. L. (San Diego, Calif.)

Purpose of Study: To ascertain the size, type and quantity of shop equipment now being used for woodworking in the California senior high schools and to establish a reasonable means for compiling a representative equipment inventory for woodworking in these schools.

Source of Data: Books, bulletins of the California State Department of Education, manufacturers publications, periodicals, and local school district publications. Questionnaires were sent to the different school districts of the State; as many different types of schools as possible were selected.

Findings and Conclusions: Findings from the survey varied widely, due in part to the difference in plan and organization of the high schools at the local district level. The needs expressed for a 4-year high school are different from those of a 3-year high school. Some California high schools are primarily vocational-technical high schools and present equipment needs of a highly specialized nature. However, a high degree of similarity exists in equipment needs expressed by high schools offering a 3- or 4-year program of general education. The needs for a rural high school are slightly different from those in urban areas.

4183. SMITH, HERSCHEL JOHN. *An Evaluation of Industrial Arts Programs in Mississippi Public Schools for Negroes During the Year 1954–55.* M.A. 1955, University of Minnesota, 98 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To ascertain the extent to which industrial arts programs in Mississipi's Negro public schools are meeting the needs of the pupils and the school community, to obtain a statewide picture of the qualifications of industrial arts teachers, physical facilities, nature of offerings, and instructional materials, and to compare departments with the recommendations for departments set forth by the Mississippi State Department of Education.

Source of Data: Questionnaires sent to 12 teachers and personal visits to 5 of the responding schools.

Findings and Conclusions: A definite need for improvement in certain areas of the Negro high school industrial arts programs includes: A greater variety of offerings, more auxiliary rooms for specific areas, and a greater variety of publications, reference materials, textbooks, and consumer literature. Physical facilities need improvement. The training and experience of the industrial arts teachers seem sufficient for the present; if facilities are improved, broader training will be necessary.

4184. SNYDER, DONALD EUGENE. *An Analysis of Medium-Size, Power-Driven Equipment Used in Industrial Arts Composite General Shops.* M. Ed., 1956, The Pennsylvania State University, 42 p. L. (University Park)

Purpose of Study: To derive and illustrate a method of comparing the brands of medium-size, powerdriven equipment by the use of literature obtainable from the maufacturers.

Source of Data and Method of Study: A request sent to companies located in northeastern United States which produce machines suitable for use in industrial arts composite general shops. As the descriptive literature was received, it was sorted into groups according to the item of machinery to which it pertained. The groups of information were analyzed separately, and the data necessary for comparing the characteristics of each brand were deduced, to compare the most important equipment features characteristic of each brand. The tabulated data were then refined and presented for 14 items of machinery.

Findings and Conclusions: The manner of presenting the data illustrated a method for analyzing the literature obtainable from manufacturers in order to compare the brands of machinery suitable for industrial arts use. This method of comparing the brands of machinery may be employed by industrial arts teachers confronted with the problem of selecting equipment.

4185. SONES, ERNEST VICTOR. ***A Petroleum Refining Vocational Technical Education Program for Casper College.*** **M. Ed. 1959, Colorado State University, 106 p. L. (Fort Collins)**

Purpose of Study: To determine the areas of training that should be developed at Casper College to prepare technicians, to upgrade skilled workers, and to retrain workers for the three refineries in Casper, Wyoming.

Source of Data and Method of Study: Data secured by means of a personal survey of the three refineries in Casper, Wyo. Texaco, Inc., the Mobil Oil Company, and the Standard Oil Company of Indiana were surveyed in those areas or divisions where technicians, skilled and semiskilled workers were employed. The job classifications were analyzed in terms of work conditions and work performed.

Findings and Conclusions: Courses should be offered in the college for technical and skilled job classifications in the area of applied chemistry, applied physics, instrumentation, and applied mathematics. Courses in human relations and labor-management relations are important. Specific courses should be organized for special job classifications; this may require another survey of allied industries.

4186. SPIES, JOSEPH PETER. ***Industrial Arts Auto Mechanics.*** **M.A. 1957, University of Minnesota, 127 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To compile material particularly suited to the teaching of industrial arts auto mechanics and organize this material into a teaching guide.

Source of Data: Periodicals, books, courses of study, experience in auto mechanics schools, and discussions with teachers of auto mechanics. In addition, a course in nonvocational auto mechanics was taught for 5 years to determine the effectiveness of presenting certain materials and methods.

Findings and Conclusions: Existing auto mechanics textbooks were less motivating than easier-to-read printed materials supplied by the education sections of the automobile manufacturing companies which were well illustrated and supplemented with slides and motion pictures. Discussion must be supplemented with demonstration, comparison of new and worn auto parts, and actual work experience on a shop automobile. The teaching of auto mechanics utilizes numerous scientific principles and a basic understanding of electricity, hydraulics, metal craft, physics, and chemistry. The function of industrial arts auto mechanics is to present the opportunities available in the industry and to explore the aptitudes of those enrolled.

4187. SPRAGUE, LARRIE T. ***Seniority Clauses of Selected Office Union Contracts.*** **M.A. 1959, Western Michigan University, 67 p. Waldo L. (Kalamazoo)**

Purpose of Study: To trace the development of (1) the "dignity of labor" concept, (2) the present status of so-called "white collar" workers in industry and big business, (3) the reasons why some of these workers organized into unions, (4) the results of union organization for these workers, (5) the arrangement, scope, and content of seniority clause provisions in selected office union contracts, and (6) the degree to which unions have organized office and technical areas.

Source of Data: The survey technique was used in securing information from unions, manufacturers' associations, government agencies, industrial firms, and in limited visits.

Findings and Conclusions: Unions have not been too successful in organizing the office areas, partly because of the strong sense of loyalty office workers have for those with whom they work closely. The advantages of better working conditions have been offset, and in most instances surpassed, by gains made by production workers after their unionization. Living costs have been constantly on the increase for the period of time covered by this investigation. Management would doubtless have given substantial increases to their white collar help in the steel industry had there been no union organization of the office area. Management not only has to live with the production and maintenance workers in the shops, but also with those with whom they "rub elbows" daily, namely, the white collar workers. The organization of any area or facet of industry, not previously organized, usually means more work, worries, and increased costs for management. For this reason, management has sometimes been slow to encourage or allow the organization of white collar workers within the business or industry.

4188. STEGMAN, GEORGE KENNETH. *A Rating Scale for Measuring the Techniques of Mechanical Drawing Plates on the Secondary School Level.* M.S. 1957, Stout State College, 100 p. L. (Menomonie, Wis.)

Purpose of Study: To devise a reliable rating scale for the evaluation of mechanical drawing plates on the secondary school level.

Source of Data: Professional literature and a review of relevant rating scales now available.

Findings and Conclusions: The scale was found to be reliable by the test-retest method; correlations of from 0.78 to 0.98 were achieved by the five raters re-evaluating the drawings.

4189. STEVENS, DeWEESE W. *A Comparison of Costs of Graphic Arts With Other Industrial Arts Areas.* M.S. 1956, Oregon State College 64 p. L. (Corvallis)

Purpose of Study: To ascertain whether the cost of equipment and supplies in a graphic arts shop is excessive as compared with other industrial arts shops, to establish an order for adding new industrial arts shops, and to ascertain the reasons for the exclusion of graphic arts from the industrial arts program.

Source of Data: A questionnaire and personal interviews with administrators, supervisors, and department chairmen of secondary schools in the State of California.

Findings and Conclusions: The graphic arts program is not excessive in cost of equipment and supplies in relation to other areas of industrial arts. Evidence was found that there is a definite order in which new industrial arts shops are established. Graphic arts is being excluded from the industrial arts program due to a shortage of teachers.

4190. STEWART, WALTER A. *Industrial Arts in Continuation and Adjustment Education in San Diego.* M.A. 1959, San Diego State College, 121 p. L. (San Diego, Calif.)

Purpose of Study: To ascertain the position of industrial arts in continuation and adjustment education and to denote the teaching methods used in a continuation and adjustment school.

Source of Data: Books, periodicals, publications of the government, learned societies, documents, and unpublished materials. A survey was made of the industrial arts classes of the Snyder Continuation High School in San Diego, California.

Findings and Conclusions: The adjustment student resists group work or any supervision by his fellow students. However, there should be further study on some type of personnel system to help prepare him to take his place in industry.

4191. STONE, EDWIN HAROLD. *Status of Iowa Industrial Arts Teachers.* M.S. 1959, Iowa State University, 65 p. L. (Ames)

Purpose of Study: To correlate latest available data of Iowa industrial arts teachers with studies made previously.

Source of Data: The Iowa Educational Directory, 1958–1959, and the teacher information folders on file at the State Office Building, Des Moines, Iowa.

Findings and Conclusions: A trend toward specialization in industrial arts was apparent, over an 18-year period. There was a sharp reduction in number teaching in both industrial arts and other subject areas.

Iowa industrial arts teachers are leaving the profession, the State, or the industrial arts area 30 years before retirement could be assumed.

A gradual increase in the percentage of Iowa industrial arts teachers with master's degrees was noted in the period from 1940 to 1958.

4192. STUBBART, SHAFER FREDERICK. *A Suggested Course of Instruction for a General Metal Shop Stressing Pre-Engineering Preparation.* M.A. 1957, San Diego State College, 109 p. L. (San Diego, Calif.)

Purpose of Study: To develop a course of instruction for general metal shop which stresses pre-engineering training.

Source of Data: Available literature pertinent to the field.

Findings and Conclusions: The course of instruction for comprehensive metal shop which was considered valuable background for pre-engineering students included the following areas: electricity, machine shop, welding, engine mechanics, hydraulics, design, stress-strain studies, and foundry. Subject matter was grouped for presentation as materials, processes, or fabrications. This grouping provided opportunity for comparison of one material with another or one method of processing with another.

4193. **SUESS, ALAN ROMAN.** *An Analysis of the School Maintenance Activities of Industrial Education Teachers in a Selected Group of Michigan Schools.* M.A. 1959, Western Michigan University, 74 p. L. (Kalamazoo)

Purpose of Study: To ascertain the tool and equipment maintenance activities most frequently occurring in the daily work of industrial education instructors in Michigan and to ascertain the college preparation in maintenance activities received by these instructors.

Source of Data: Questionnaire survey of 500 industrial education teachers in Michigan.

Findings and Conclusions: Respondents recommended that a class in school shop tool and equipment maintenance should be a part of the industrial education teacher-training program. Maintenance activities that are closely related to manipulative skills and machine operations seem to be adequately emphasized. However, maintenance problems common to several areas and/or maintenance problems not specifically a part of a manipulative operation or a machine operation need additional emphasis at some point in the teacher-preparation program.

4194. **SULENTIC, MILO NORMAN.** *A Survey of Industrial Arts in the Public Schools of North Dakota.* M.A. 1959, Iowa State Teachers College, 46 p. L. (Cedar Falls)

Purpose of Study: To determine the facilities, equipment, type of shops, offerings in industrial activities and preparation of industrial arts teachers in all public school offerings in the State of North Dakota.

Source of Data: Personal interview of industrial arts teachers located in the public schools of North Dakota.

Findings and Conclusions: Woodwork and drawing were offered most often. The range in shop size was large, both in actual square feet and square feet per student. Adequate storage space was generally lacking. Industrial arts was taught in only 25 of 62 North Central approved schools. Sixty of the 74 teachers had completed a major in industrial arts; 5 teachers had completed neither a major nor minor. Industrial arts was offered to girls in only 8 schools. Thirty-nine teachers planned to add at least one area to their programs. Only 7 schools allotted an annual budget for the industrial arts program. Reorganization seems to be important for further growth in industrial arts.

4195. **SUMMERS, LOWELL P.** *A Course of Study in Aviation Education Including a Survey of Utah High Schools.* M.S. 1956, Utah State University, 245 p. L. (Logan)*

Purpose of Study: The purpose of this study was two-fold: (1) to ascertain the present status of aviation education in Utah high schools; and (2) to develop a course of study in aviation education which might meet the needs of those schools presently teaching this course and schools contemplating a regular class in aviation education.

Source of Data and Method of Study: A questionnaire-type information form was mailed to each Utah high school. The returns were tabulated to show the number of high schools in each multiple of 300 enrollment grouping, the number presently teaching aviation education, certain activities of the aviation education program, high schools not teaching aviation education and their reasons for not teaching this course.

Findings and Conclusions: It was found that of the 79 high schools contacted, 13 were teaching aviation education, and 9 were contemplating a course within the next 2 years. The greatest reason given for not teaching aviation education was the unavailability of trained teachers.

The course of study was developed on the informational outline pattern. It consists of 8 units of study, each unit being divided into sections. There is a total of 59 sections in the course. The major units covered are Air Transportation, Know Your Airplane, Theory of Flight, Aircraft Model Building, Aircraft Powerplants, Meteorology, and Navigation.

Recommended textbooks with chapter and page references are listed at the beginning of each section. Class activity suggestions and demonstrations, together with an annotated film listing, are presented at the end of each individual section.

4196. **SWANSON, HAROLD I.** *An Experiment to Determine the Relative Effectiveness of an Instant-Correction Type Test as a Teaching Device.* M.S. 1954, The Pennsylvania State University, 74 p. L. (University Park)

Purpose of Study: To ascertain the relative effectiveness of an instant-correction test as a teaching device.

Source of Data and Method of Study: The experiment was conducted with an experimental and control group of 118 eighth-, ninth-, and tenth-grade boys with woodworking experience from three schools. Both sections received the same battery of three parallel tests, with the exception of the instant-correction answer sheet for test II which was given only to the experimental section.

Findings and Conclusions: The instant-correction test is effective as a teaching device. No clues or hints can be obtained by students from the chemically impregnated answer sheet of the test. The level of intelligence of the students does not significantly affect the amount of learning that occurs while the students are taking this type of test.

4197. SWENSON, DAN H. *A Guide To Be Used in Evaluating Audiovisual Aids for Use in the Teaching of Industrial Arts in the Junior High Schools of Utah.* **M.S. 1949, Utah State University, 109 p. L. (Logan)***

Purpose of Study: To ascertain which audiovisual aids can contribute most to making subject material meaningful in each of the subject-matter areas included in the industrial arts programs of the Utah junior high schools.

Source of Data: Most of the junior high school industrial arts teachers of Utah and the department heads of industrial education departments in most of the colleges and universities in the Nation having industrial arts teacher-training programs. A questionnaire sent to the above-mentioned persons was used in gathering the data.

Findings and Conclusions: It was found that each subject-matter area requires different audiovisual aids to strengthen visual impressions and to make teaching more meaningful. Motion pictures were recommended as the first choice, in most instances, for introducing students to new subject-matter areas. The demonstration was favored for the teaching of basic skills.

The effectiveness of each of the audiovisual aids considered in the study can be found, in descending order, by referring to the bar-graphs dealing with different aspects of each of the subject-matter areas.

The study deals with types of visual aids and makes no attempt to evaluate specific instructional materials. The author points out the need for careful selection from among the vast number of aids which may be included in each of the types. An extensive appendix dealing with factors in planning for the use of audiovisual aids in the teaching of industrial arts is also included.

4198. SYRING, KENNETH R. *The Attitude of Industrial Arts Teachers Toward Their Program in the State Teachers Meetings.* **M.S. 1958, Kansas State College of Pittsburg, 75 p. Industrial Education and Art Department (Pittsburg)**

Purpose of Study: To study the programs of the Kansas State Teachers Association conventions for industrial arts teachers, the teachers' attitudes toward these conventions, and suggestions for future programs.

Source of Data: Questionnaires and personal interviews with persons in charge of the State teachers meetings.

Findings and Conclusions: The demonstration type of program is the most popular. Displays of shop equipment and materials are also popular types of programs. Teachers who do not attend feel the programs do not contribute to their work.

4199. THARPE, FRANK DOUGLAS. *Usefulness of the Kuder Preference Record for Predicting Shop Achievement of Senior High School Students in Industrial Arts.* **M.S. 1955, Iowa State College, 46 p. L. (Ames)**

Purpose of Study: To evaluate the usefulness of the ten interests of the Kuder Preference Record in the prediction of achievement in industrial arts.

Source of Data: The Kuder Preference Record administered to students in the Alfred E. Beach High School, Atlanta, Ga.

Findings and Conclusions: The Kuder Preference Record was not a satisfactory instrument for predicting achievement in industrial arts in the Alfred E. Beach High School.

4200. THOMPSON, JESSE M. *James P. Haney's Contribution to Industrial Arts.* **M.S. 1955, North Texas State College, 37 p. L. (Denton)**

Purpose of Study: To examine the writings of James P. Haney and to ascertain his contribution to industrial arts.

Source of Data: Magazine articles and lectures by Haney which portray his philosophy of industrial arts.

Findings and Conclusions: By coordinating industrial arts with other subject matter areas, Haney was the first to carry out successfully what Froebel advocated; namely, using material things to develop the child's self-activity. Haney devoted his life to the school system of New York City and is probably responsible for gaining acceptance for industrial arts in the total program of education.

4201. TITUS, LEWIS CLARK. *A Study of Tests Available for Use in Industrial Arts and Procedures Used by Industrial Arts Teachers in Ascertaining Student Progress and Semester Grades.* **M.S. 1956, North Texas State College, 125 p. L. (Denton)**

Purpose of Study: To survey the types of tests generally used in educational measurement with emphasis upon their implications for industrial arts, to identify the test most applicable to industrial arts, to ascertain what portion of the final grade is determined by test scores, and to identify factors other than test scores used in arriving at a final grade.

Source of Data: Books and articles taken from professional literature pertaining to testing and grading in the field of industrial arts and questionnaires returned from 100 industrial arts teachers in Texas.

Findings and Conclusions: Tests most used by industrial arts teachers were informal-objective tests given each 6 weeks, at the end of a unit of study or the end of a process. Only a slight majority of the teachers had received instruction in test construction. Teachers of industrial arts are in need of instruction in the interpretation of tests having to do with guidance.

4202. TYRREL, JERRY H. *Predicting Graduation Probabilities of Utah State University Freshman Engineering Students.* **M.S. 1958, Utah State University, 54 p. L. (Logan)***

Purpose of Study: To establish a criterion to serve as an aid to counselors, advisors, and students in predicting student success in engineering programs at Utah State University.

Source of Data and Method of Study: Official university records of 585 graduating engineers from 12 graduating classes, 1946 through 1957, at Utah State University. Students selected entered as freshmen and had completed the sequence of 4 basic engineering courses; namely, mathematics through analytical geometry; freshman English, 3 quarters; engineering drawing, 3 quarters; and beginning chemistry, 2 quarters. No transfer students were used in the study.

Findings and Conclusions: Total grade point average by quarter, using the four basic engineering courses, were more valuable than any single sequence class (such as English 1, 2, 3) for predicting the grade-point average at graduation. Grade-point averages of these four basic engineering courses when correlated with the grade-point average at graduation gave a correlation of 0.828. This was considered to be a highly significant correlation. The higher the student's grades in the mathematics sequence, the better were his chances for completing his 4-year curriculum in engineering. The grade-point average in the four basic engineering courses can be used to predict the student's grade-point average at graduation, and in most cases it will not vary more than one-third of a grade point. Almost without exception, the grade-point average at graduation was slightly less than the grade-point average computed from the four basic engineering courses.

4203. ULRICH, WALTER E., JR. *What the Industrial Arts Instructors of the State of Utah Consider a Sound Public Relations Program.* **M.S. 1954, Utah State University, 73 p. L. (Logan)***

Purpose of Study: To study the views and ideas of the Utah industrial arts instructors and to select from this material what would generally be the best, or one of the better, public relations programs.

Source of Data: Literature in the industrial arts field and a questionnaire sent to industrial arts teachers throughout Utah to determine what the teachers considered a good public relations program.

Findings and Conclusions: About 50 to 60 percent of the industrial arts teachers of the State of Utah have some form of public relations program. The teachers considered the majority of the elements used in the study to be good for a public relations program, but in most cases only a portion of the teachers are actually using the elements to any extent. Some instructors seemed to be doing an excellent job in public relations, while others were reluctant to do much of anything. An effective program in public relations helps to obtain support for the school from the community, wins support from the administration for the department, and helps to further the total school program. The most effective public relations are generally founded on personal integrity, common sense, initiative, and a general attitude of friendliness.

4204. VAN AUSDAL, G. DUANE. *A Study To Determine the Extent to Which Design Fundamentals Are Taught to Industrial Arts Students in the Secondary Schools of Utah.* **M.S. 1958, Utah State University, 58 p. L. (Logan)***

Purpose of Study: To ascertain the extent to which industrial arts design is taught in the secondary schools throughout the State of Utah, and to provide data on the qualifications of industrial arts teachers to teach fundamentals of design.

Source of Data and Method of Study: Industrial arts teachers were sent a questionnaire to determine the extent to which industrial arts design was being taught, in what departments of the school it was being taught, the extent of copying permitted, and the training in design which teachers had received.

Findings and Conclusions: There was a general lack of instruction in the fundamentals of design, and many teachers did not attempt to teach the subject. Supervision was felt to be of considerable importance. There is a lack of design knowledge. It is believed that more emphasis should be given to instruction in design fundamentals.

4205. **VANDERBERG, PAUL S.** *A Study Guide for Junior High School Industrial Arts Drawing.* M.A. 1941, The University of Michigan, 69 p. L. (Ann Arbor)

Purpose of Study: To develop a study guide for the use of instructors in the junior high school industrial arts drawing classes of the Kalamazoo, Michigan, public schools.

Source of Data and Method of Study: Results of a study conducted in Kalamazoo in 1939 to discover the extent of employment in drafting occupations, to ascertain the needs of employers, to secure information useful in vocational guidance, to obtain accurate knowledge about drafting equipment, and to anticipate some of the future requirements of the drafting field. Information obtained from this study was for the purpose of bringing about closer cooperation between the schools and industry. Following the completion of the study a reorganization of the senior high school and junior high school drawing curriculum was undertaken and was based upon findings set forth in the report. It is with this reorganization that this study guide is concerned.

Findings and Conclusions: This study outline is intended to serve as a guide to teachers of industrial arts drawing and as an aid in directing the desirable growth of the pupils in their classes in compliance with the objectives of general education and industrial arts on the junior high level.

4206. **VARLEY, JESSE LINCOLN.** *The Industrial Arts and the Philosophy of Herbart.* M.S. 1956, North Texas State College, 71 p. L. (Denton)

Purpose of Study: To analyze the philosophy of Johann Friedrich Herbart to ascertain whether the philosophy of present-day industrial arts tends to make his philosophy more meaningful and far-reaching.

Source of Data: Books, periodicals, pamphlets, dictionaries, encyclopedias, and other published and unpublished materials.

Findings and Conclusions: Herbart's philosophy and theories of education have been almost completely abandoned, although there is evidence that his philosophy did influence the educational system in America. Evidence indicates that if Herbart had lived today he would have included in his philosophy and doctrine areas of work closely related to present-day industrial arts.

4207. **VARLEY, ROY L.** *The History of the Industrial Arts Department at North Texas State College from 1911 to 1955.* M.S. 1956, North Texas State College, 82 p. L. (Denton)

Purpose of Study: To record the beginning, growth, and changes of the industrial arts department at North Texas State College.

Source of Data: Theses, school annuals, bulletins published by the college, and personal interviews with administrative officers, instructors, and others who could give reliable information concerning the past and present history of the department.

Findings and Conclusions: The industrial arts department at North Texas State College was created in 1911, as a result of a bill passed by the State legislature in 1909. Enrollment in the department was small between 1911 and 1930, ranging from 52 to 137 students per semester; the greatest increase came after World War II and reached its peak in 1950, when 1,300 students were enrolled. A program leading to the bachelor of science degree with a major in industrial arts was approved in 1919 and the master of science degree in 1944. Many changes were made from time to time in the curriculum and in the number of hours required for a major.

4208. **WAKEFIELD, JAMES CLIFFORD.** *An Investigation of the Effectiveness of a Vocational Rehabilitation Training Program for the Physically Handicapped in a Provincial Trade School.* M.A. 1959, University of Minnesota, 145 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To ascertain to what extent the vocational rehabilitation program offered by the Manitoba Technical Institute assisted physically handicapped persons.

Source of Data: After reviewing current literature to determine the history and extent of development of the vocational rehabilitation facilities available to physically handicapped persons, a study was made of school and social agency records on the first 50 such persons trained in a newly established rehabilitation program.

Findings and Conclusions: A coordinated program can be effective in utilizing all the facilities found in a community, whether these facilities are owned by a private or a government agency. Vocational rehabilitation greatly improved, at a very small cost to society, the social and financial positions of the students studied.

4209. WALLIS, CARL RANSOM. ***Student Costs for Industrial Arts Courses in Utah High Schools.*** **M.S. 1957, Utah State University, 90 p. L. (Logan)***

Purpose of Study: To ascertain the average yearly cost to the student taking industrial arts courses in Utah high schools. To determine the costs in different schools and whether or not the size of school had a bearing on the per-student costs. To find the variation of costs, if any, for similar materials.

Source of Data and Method of Study: The survey method, using information forms, was used to gather the necessary data. Information forms were received from 119 Utah high school instructors of industrial arts and 38 superintendents of Utah school districts.

Findings and Conclusions: The type of program offered had an influence on the per-student costs. The average per-student cost was found to be $9.65. Costs in different schools varied somewhat according to size, with the schools in the three largest population groups showing smaller costs to the students than the schools in the other groups. Prices for similar materials were found to vary considerably in some instances.

4210. WALSTON, HARRY WADE. ***Drafting in the Tampa Area—A Supplement to Mechanical Drawing Instruction.*** **M.A. 1956, University of Florida, 74 p. L. (Gainesville)**

Purpose of Study: To justify the objectives of industrial arts education with reference to the mechanical drawing program by means of a descriptive illustration of industrial applications of the subject matter.

Source of Data: The Tampa Chamber of Commerce, the Florida State Employment Service in Tampa, and individuals (by means of interviews and questionnaires).

Findings and Conclusions: Industrial arts does not primarily train students for industry but rather educates them for a life in which industry is one of the major elements. The student's contact with industry is limited; therefore, the importance of utilizing community resources to supplement the industrial arts program may be justified from the standpoint of effective teaching, which demands accurate presentations of modern trends in industrial development.

4211. WALTON, HOWARD RALPH. ***A Program of Industrial Arts Accident Reporting For the State of Minnesota.*** **M.A. 1955, University of Minnesota, 113 p. Department of Industrial Education (Minneapolis)**

Purpose of Study: To review and analyze significant findings of prior studies on safety in the industrial arts shops in an effort to prepare a listing of the data needed for the improvement of specific instruction designed to develop safe behavior in the industrial arts students, and to build a concise, convenient, effective data collecting instrument which would provide this needed data for the entire State of Minnesota.

Source of Data and Method of Study: Data were secured from writings on industrial, vocational, and industrial arts safety, and from selected master's and doctoral theses. The conclusions of these studies were analyzed to determine the known factors which indicated accident proneness. From this list it was concluded what information was still needed to detect poor behavior patterns. Thus an instrument was designed which would collect the desired data.

Findings and Conclusions: The major causal or contributory factor to accidents was the acts of the individual. Further improvement of the industrial arts safety program is in the understanding of the psychological factors operative in accident proneness. It seemed reasonable to assume that the detection of accident proneness and the development of safe work habits and attitudes on the part of the individual industrial arts student will reduce the number and severity of shop accidents. Education can and should assume a leading role in safety and accident prevention. It seemed reasonable to assume the safety conditions existing in other States of the United States are equally pertinent to the State of Minnesota. An effective accident reporting program for the entire State can collect data which will provide the means for improving Minnesota's industrial arts shop safety program.

4212. WARD, TRAVIS CLIFFORD. ***Status and Offerings of Industrial Arts Courses in the Junior High Schools of Missouri.*** **M.A. 1958, Northeast Missouri State Teachers College, 47 p. L. (Kirksville)**

Purpose of Study: To ascertain the current status and offerings of industrial arts in the public junior high schools of the State of Missouri.

Source of Data: Questionnaires mailed to the teachers of industrial arts in the junior high schools of Missouri.

Findings and Conclusions: Both the general shop and unit shop courses were offered in the junior high schools of Missouri; however, the general shop was found to be the most predominant. The areas which were covered in the general and unit shops were metalwork, woodwork, crafts, drawing and planning, and electricity. Crafts ranked first in the unit shops. Electricity was the area least offered in both general and unit shops. Most instructors favored girls taking industrial arts courses; however, many of the administrators of the schools were against this practice. In schools which permitted girls to enroll in industrial arts, only a few girls actually were enrolled. Average class size consisted of from 20 to 24 students.

4213. WATANABE, HERBERT S. *The Significance of High School Mathematics, Science, and Industrial Arts in Hawaii's Technical Schools.* M.S. 1958, Stout State College, 196 p. L. (Menomonie, Wis.)

Purpose of Study: To provide knowledge of the value attached to related subjects in the technical schools of Hawaii by instructors and students so as to develop a guide for the improvement of such work. To serve high school students and counselors as a guide in planning high school work for those intending to go to technical schools.

Source of Data: Questionnaire replies from 664 trade and industrial students and 34 trade and industrial instructors in 4 area technical schools in Hawaii.

Findings and Conclusions: General mathematics and algebra I and II and general science and physics were the two mathematics and the two science courses which technical school students and instructors indicated most frequently as being valuable and important to the various trades. These courses were also suggested to high school students planning to enter the technical schools.

4214. WATKINS, JOHN WILLIAMS. *The Forest Products Industries—A Resource Study for Use in the Industrial Arts Curriculum.* M.A. 1959, Ohio State University, 129 p. L. (Columbus)

Purpose of Study: To develop a resource study of the forest products industries for use in the industrial arts curriculum.

Source of Data: Library sources; correspondence with the industries, associations, and companies; and a review of the free and inexpensive teaching material on the subject: books, pamphlets, charts, and films.

Findings and Conclusions: The forest products industry has influenced the Nation's history and economy; it should be taught as a unit by industrial arts teachers. The industrial arts teacher with the use of suggested information and material can have a program of more depth and breadth, a program that introduces more about the industries and a program that comes closer to the present objectives of industrial arts education.

4215. WEBB, MYRTLE ROARK. *Industrial Arts Activities for an Elementary School.* M.A. 1956, University of Florida, 115 p. L. (Gainesville)

Purpose of Study: To select and test in the elementary classroom certain industrial arts activities.

Source of Data: Books, articles dealing with industrial arts in elementary schools, and experiments in handcraft work in various media.

Findings and Conclusions: Many industrial arts activities were found to be highly effective in the fourth- and fifth-grade curriculums. Particularly important were the elements of motivation and the implementation of other areas of learning.

4216. WEEKS, WILLIAM R. *A Study of the Predictability of High School Grades and the Differential Aptitude Tests for Predicting Success in a Two Year Terminal Program at Western Michigan University.* M.A. 1957, Western Michigan University, 63 p. L. (Kalamazoo)

Purpose of Study: To explore the degree to which high school grades and the Differential Aptitude Tests could be used as predictors of possible success in the 2-year terminal technical program at Western Michigan University.

Source of Data: The Registrar's Office, Western Michigan University, pertaining to the high school and college grades of 106 2-year vocational technical students to whom the Differential Aptitude Test Battery was administered.

Findings and Conclusions: High school grade-point averages do not show any significant relationship to grades made by the same students in the 2-year terminal technical program at Western Michigan University. Although the correlations between the grade-point averages in high school subjects and certain areas in college were in all cases positive and in some instances above 0.50, the fact that college grades ranged from a low of E (failure) to a high of A for those students who had C averages in high school would indicate that caution should be employed in using high school grades as predictors of success in college. Comparisons of means, standard deviations, coefficients of correlation, and critical ratios between college grade-point averages and test results show rather conclusively that scores made on the verbal, numerical, abstract, and spacial sections of the Differential Aptitude Test may be used as predictors of success in college.

4217. WEIDMAN, BURTON ELWIN. *Industrial Arts as a Medium of Public Relations in Secondary Education.* M.S. 1957, Oregon State College, 99 p. L. (Corvallis)

Purpose of Study: To sample opinion and practice in Oregon secondary education relative to the use of industrial arts as a public relations medium, and to learn how this school subject can be used more advantageously in this capacity.

Source of Data: A questionnaire sent to administrators and industrial arts teachers in selected secondary schools in Oregon.

Findings and Conclusions: More cooperative school planing is needed relative to school public relations. A wider range of public relations techniques should be used more consistently by industrial arts teachers.

4218. WEISS, NORBERT EUGENE. *Selecting Textbooks for Industrial Arts.* M.A. 1956, University of Minnesota, 109 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To design an appraisal scale according to accepted criteria as revealed in the literature on appraisal of textbooks, to evaluate a number of textbooks in industrial arts according to the scale, and to help industrial arts teachers to select industrial arts texts.

Source of Data: A study of textbook rating scales found in the library.

Findings and Conclusions: Criteria most important in selecting industrial arts textbooks are: recent copyright, authoritative author, many photographs, job sheets and related information sheets provided, and reasonable cost.

4219. WELBURN, WAYNE. *Project Evaluation for General Metal and General Woodwork Industrial Arts.* M.S. 1959, Utah State University, 65 p. L. (Logan)

Purpose of Study: To ascertain the variations found in the grades of a group of woods and metals projects when graded by a group of qualified industrial arts teachers. An effort was made to find out if the use of a project rating scale would aid in more consistent evaluation of student-made projects.

Source of Data and Method of Study: A representative collection of projects was graded. The participants were asked to list the items they had considered in grading the projects. From this list and from current industrial education material a rating scale was devised. The projects were again graded, on this scale. The results of the two gradings were compared statistically to determine if there had been a significant change in the grades as a result of using the rating scale.

Findings and Conclusions: Tables of grades, graphs of grades, photographs of projects used, and the rating scale are included in the completed study. The study shows which items were considered to be the most important in grading projects. Such items as design, quality of workmanship, and quality of finish were shown to be important. In most cases the use of the rating scale resulted in much more consistent evaluation of student-made projects. In these cases the differences were statistically significant.

4220. WENDT, DONALD DEAN. *A Survey of State Courses of Study for Industrial Arts Electronics in Senior High School.* M.A. 1959, Nebraska State Teachers College, 71 p. L. (Peru)

Purpose of Study: To ascertain the extent and content of electronics in State courses of study for industrial arts electronics in the senior high school.

Source of Data: A systematic examination of available State courses of study in industrial arts electronics.

Findings and Conclusions: More attention is being given to the aspects of electronics centered around radio and television. A course length between 18 and 36 weeks seems to be desirable to provide suitable experience in electronics. Instruction can be achieved more efficiently through use of kits. There seems to be adequate source material available for electronics. A course in electronics should include radio, television, computers, control circuits, and electrical devices. In the teaching of electronics the relationship and responsibilities between the industrial arts department and the physics department should be clarified.

4221. WHIGHAM, FRANK FREDERICK. *A Survey of the Junior High School Drafting Program in San Diego.* M.A. 1958, San Diego State College, 159 p. L. (San Diego, Calif.)

Purpose of Study: To ascertain the adequacy of the San Diego junior high school drafting department in teaching the various aspects of drafting.

Source of Data: Books, periodicals, bulletins of educational organizations, previous research, and a questionnaire sent to each drafting instructor in the San Diego City Schools.

Findings and Conclusions: It is evident that there are many variations in the drafting program in the San Diego junior high schools relative to the time devoted to the various aspects. Some of the variations are extreme. One instructor reported that his students spend 40 percent of their time on sketching while another reported that his students spend 40 percent of their time on measuring. These reports, whether high or low, contribute to a mean time that in every case is acceptable in the opinion of this writer. The recommended courses of study for both the seventh and ninth grades can be used by drafting teachers to evaluate their present program.

4222. WHITFIELD, THERON WAYNE. *An Investigation of Educational Closed-Circuit Television and Its Adaptability to the Industrial Arts Field.* M.A. 1958, University of Minnesota, 93 p. Department of Industrial Education (Minneapolis)

Purpose of Study: To investigate closed-circuit television applications in education, to ascertain the quality and quantity of television teaching, and to assimilate the most desirable characteristics of TV teaching for future applications in the industrial arts field.

Source of Data: Reports of studies by leading educational institutions on teaching closed-circuit television and books by noted authors in the field.

Findings and Conclusions: The ability of television to teach skills and the effectiveness of narration and demonstration through this medium indicate that within the next few years an increasing number of industrial arts teachers will make use of closed-circuit television as a medium of instruction, a teaching aid, or a public relations device. Television has been found to be particularly effective in presenting close-up demonstrations. Experienced television teachers believe that interest in the use of the medium is growing. Provision for installation is included in most new construction.

4223. WHITTEN, BENJAMIN C. *Certification, Training and Employment of Industrial Arts Graduates of Negro Teacher Training Institutions in Ten Selected States.* M.S. 1948, The Pennsylvania State University, 85 p. L. (University Park)

Purpose of Study: To determine the training opportunities, certification problems, and employment opportunities of industrial arts graduates of Negro teacher training institutions located in 10 States, namely Delaware, Kentucky, Maryland, Missouri, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

Source of Data and Method of Study: Information on the requirements for certification was obtained from officials of departments of education and public instruction and by studying certification bulletins of the 10 States. The teacher training institutions were sent a questionnaire concerning curriculum offerings and requirements, enrollment, and estimated number of graduates for the period 1948 to 1951. The demand for Negro industrial arts teachers, was determined through a questionnaire to each principal of a Negro secondary school located in the States being studied.

Findings and Conclusions: Certain institutions included in the study will graduate more industrial arts teachers during the 1948 to 1951 period than will be needed by the Negro secondary schools located in the same States. The teacher training programs offered by some of the institutions will not enable their graduates to meet minimum certification requirements in some of the States studied.

4224. WILKES, DORAN F. *A Survey of Industrial Arts Programs in Wyoming Schools.* M.S. 1955, Utah State University, 57 p. L. (Logan)*

Purpose of Study: To ascertain the differences and the courses in industrial arts programs of Wyoming, to construct a representative industrial arts program from results obtained, and to determine attitudes and policies of school administrators toward the program in relation to their other school programs.

Source of Data: Questionnaire replies from school superintendents and industrial arts teachers.

Findings and Conclusions: Industrial arts has developed slowly in Wyoming. There are no unifying factors, no organized industrial arts supervision and no standardization in the separate programs. Lack of funds and the existence of vocational agriculture shops are the major reasons for not having industrial arts programs. Instructional areas listed as most desirable were woodwork, drawing, and metalwork. The unit shop was favored by teachers while the general shop was favored by the superintendents. Superintendents reported a desire for a balance between industrial arts and other school courses and indicated that no significant expansion was being planned.

4225. WILLEY, LYNN R. *Growth and Development of the Present Division of Technology at Utah State Agricultural College.* M.S. 1954, Utah State University, 135 p. L. (Logan)*

Purpose of Study: To trace, mainly through analysis of causes and effects, the development of the Division of Technology at Utah Agricultural College (now Utah State University) from its beginning as a proposed Mechanic Arts Department in 1890 to its status in 1952. Particular attention was given to conditions in the national scene that gave rise to new developments in such fields as auto mechanics, aeronautics, and radio.

Source of Data: College records, newspapers, letters, board of trustees minutes, catalogs, and personal interviews. Extensive use was also made of material from books on the national development of industrial education, especially as it is related to the national land-grant program. Data were analyzed and compiled in order to give a year-by-year picture of the growing complexity and multiple functions of the Division of Technology.

Findings and Conclusions: The expanding needs of the Nation in its industrial development were closely reflected in the program in the field of technology at Utah State Agricultural College. Technology has played a vital role both locally and nationally since its pioneer beginnings. War demands met by the division of technology brought about abrupt and significant changes and developments related to the automobile, airplane, radio, and growth of technology. Expansion in technology was in keeping with the major intentions of the Land-Grant Act. The history of the Division of Technology furnished many interesting sidelights on the general development of Utah State Agricultural College.

4226. WILTSIE, WILLARD LEE. *Job Placements of Industrial Education Graduates at Iowa State College From 1945–1955.* M.S. 1956, Iowa State College, 41 p. L. (Ames)*

Purpose of Study: To survey industrial education graduates of Iowa State College from 1945 to 1955.

Source of Data: A questionnaire sent to 277 industrial education students who had graduated between 1945 and 1955.

Findings and Conclusions: Approximately 47 percent of the graduates were teaching and 42 percent were in industry. Twelve vocations were represented by the industry group, with engineering accounting for 47 percent of this group. Thirty-one percent changed from teaching to nonteaching, with only 9.4 percent going from industry to teaching. The average salary of the teaching group was $4,313; of the group in industry, $5,899.

4227. WINDERL, LAWRENCE WILFRED. *An Historical Study of the Puget Sound Naval Shipyard Apprentice School.* M. Ed. 1955, University of Washington, 95 p. L. (Seattle)

Purpose of Study: To record the beginning, growth, and results of apprenticeship in the Puget Sound Naval Shipyard during the period from 1901 to 1955.

Source of Data: Government records, correspondence files of apprentice supervisors, the personal collection of papers of the first apprentice supervisor, John Lindberg, a weekly paper, *The Navy Yard Salute,* and former apprentices.

Findings and Conclusions: The first apprentices were employed in the shipyards in 1901, ten years after the establishment of the Puget Sound Naval Shipyard. The number of apprentices has increased from 6 to approximately 500. The first related training was provided in 1914 by naval officers. The early requirements for eligibility were: 15 years of age and the equivalent of a fourth-grade education, plus the recommendation of five people. In 1928 the requirement was changed to having a passing grade on a United States Civil Service examination. Lieutenant Commander O. D. Adams was appointed in 1940 as the first Training Officer. In 1946 a civilian supervisor was appointed head of the training department. Instructors for the academic subjects have been provided for the Apprentice School since 1922 by the Bremerton Public Schools. Twenty high school credits may be obtained for successfully completing a 4-year apprenticeship. Olympic Junior College grants 45 credits toward an Associate in Technical Arts diploma.

4228. WINEGARDEN, JAMES FRANKLIN. *A Learning Index for the Midget Wiggly Block Test for Mechanical Ability.* M. Ed. 1958, Iowa State Teachers College, 31 p. L. (Cedar Falls)

Purpose of Study: To ascertain whether a relationship exists between the learning index as computed from information derived from the *Midget Wiggly Block Test* and selected factors of pupil performance: mental ability, grade-point average, and pupil ratings by teachers.

Source of Data and Method of Study: Information was secured on 100 ninth grade boys enrolled in industrial arts in West Junior High School in Waterloo, Iowa. Records were kept on name, age, case number, classification, grade-point average, scores from *Midget Wiggly Block Test* and *California Short-Form Test for Mental Maturity.* Material was used from teacher rating forms on which students were rated in routine computation facility, perception of abstraction, and problem solving. Relationships were compared with test results.

Findings and Conclusions: There were no significant relationships established between the criteria presented in the problem.

4229. **WOFFORD, THOMAS BUSHROD.** *The Establishing of Norms and the Determination of Validity of Certain Psychological Tests Used in the Guidance Centers of the Louisiana State Trade Schools.* M.S. 1957, Northwestern State College, 130 p. L. (Natchitoches, La.)

Purpose of Study: To establish performance norms for use with the testing program in the Louisiana State-operated trade schools' guidance centers and to determine the validity of using certain psyhcological tests to predict success in the day-trade courses offered by the State-operated trade schools as indicated by grades given by instructors.

Source of Data: Data were collected from selected trade schools in Louisiana on individual cards which provided psychological test scores and the students' shop marks. These data were statistically treated to present, by shop, the following information: (1) the distribution of test scores, (2) the distribution of students' marks, (3) coefficients of correlation between students' marks and students' test scores, and (4) charts showing the quartile distribution of students' shop marks compared to their test scores.

Findings and Conclusions: A mythical trade school student was pictured, on the basis of the average weighted mean scores for all shops. This student is slightly below average in intelligence when compared with the general population, but in most cases he has the same intelligence range as the tradesmen in the occupational group which he plans to enter. His achievement is at the eighth-grade level and his mechanical aptitude is eleventh-grade level. His manipulative skill is above the average industrial applicant's and his mechanical interest is above the average of the general population. Less than 1 percent failure was reported. Coefficients of correlation ranged from 0.20 to 0.40 for the various tests. Probability charts further substantiated this relationship. It was felt that the tests have a definite diagnostic value but are not the predictive instruments desired. Use of shop marks as success criteria was felt to be a weakness of the study.

STAFF STUDIES

4230. **BROWN, WALTER C.** *Diversified Occupations Graduates of 1952: A Follow-up Study.* Staff Research, 1959, 54 p. Department of Industrial Education, University of Missouri (Columbia)

Purpose of Study: To ascertain the relation of training received to employment status 5 years after graduation; the effectiveness of instruction in diversified occupations; and suggestions of graduates for improvement of the program.

Source of Data: An information form from 491 graduates representing 52 schools. Mental ability and scholastic achievement scores were obtained from the University of Missouri's College Aptitude Testing Office.

Findings and Conclusions: Five years after graduation 39 percent of the graduates were employed in the occupation for which they were trained and 14 percent were employed in a related occupation, a total of 53 percent. Findings were also recorded on geographic mobility of graduates, mental abilities and scholarship achievements, amount of diversified occupations training received, and additional training received beyond high school graduation. It was concluded that there should be more emphasis upon selection and placement procedures and broader job and related vocational training.

4231. **FLESHER, M. A., W. R. FLESHER, R. M. REESE,** *et al. Public Vocational-Technical Education in Oregon: Report of a Survey Made for the Oregon State Board of Education.* Staff Research, 1958, 368 p. Oregon State Board of Education (Salem)

Purpose of Study: To evaluate all public vocational education within the State, to study needs, and to propose recommendations for subsequent action by the State of Oregon which would result in an optimum program of vocational-technical education to meet the needs both of Oregon's employers and youth.

Source of Data: A wide variety of both lay and professional social and economic groups within the State. Questionnaires and personal contacts by members of the survey team were used to collect data.

Findings and Conclusions: Basically, the final recommendations involved the adoption of a master plan for the legal establishment of seven districts within the State, each of which could develop one or more centralized educational centers. These centers were to be authorized to offer vocational, technical, business, and distributive programs as well as 2-year college transfer programs whenever the need was evident. It was further recommended that for Oregon, all agriculture and home economics day-school classes remain in the secondary schools, but that all preparatory trade and industrial, technical and distributive classes be operated only at the educational centers. In addition, due to the peculiarities of the State, the few engineering-related curriculums now operating at Oregon technical institutes be placed under control of the State board of higher education.

4232. **ROBINSON, WALTER J.** *Trends in Industrial Arts Teacher-Training.* Staff Research, 1959, Northwestern State College, 33 p. Industrial Education Department, Northwestern State College (Natchitoches, La.)

Purpose of Study: To ascertain significant changes that have occurred in industrial arts teacher training during the last decade and changes to be made within the next 5 years concerning curriculums, methods, students, teachers, and related matters.

Source of Data: Questionnaires—of 129 mailed to institutions offering a teacher-training program in industrial arts, 84 were returned in time for tabulation.

Findings and Conclusions:

1. Electricity, electronics, plastics, and graphic arts were most frequently added to the industrial arts curriculums.
2. There is a definite trend toward making industrial arts curiculums more technical through adding more skill courses or by introducing special technical curiculums.
3. No change will be made to increase professional courses.
4. There is a trend toward requiring more science and mathematics courses for industrial arts majors.
5. Contrary to the thinking of many people, more industrial arts graduates are choosing teaching today than 10 years ago.
6. Eighty-six percent of the respondents feel that the demand for industrial arts teachers will increase within the next decade.
7. Only nine departments have a special screening device for selecting potential industrial arts majors.
8. Attainment of the master's degree was listed as the minimum educational requirement for employment in 83.3 percent of the institutions.

4233. **TOWERS, EDWARD R., and RAY, WILLIS E.** *The Status of Industrial Arts in the Public Secondary Schools of Ohio.* Staff Research, 1959, 78 p. Willis E. Ray, 2047 Neil Avenue, The Ohio State University, Columbus 10, Ohio.

Purposes of Study: To discover characteristics of industrial arts teachers in Ohio such as professional preparation, salaries, age, teaching experience, teaching combinations, extracurricular duties, and other attributes. To obtain information on shop organization, curriculum offerings, teaching load, class size, requirement of industrial arts, supply and demand, new facilities, etc.

Source of Data: Questionnaire returns from 1,533 of the 1,877 industrial arts teachers in public secondary schools.

Findings and Conclusions: A summary of the findings is included in the study, together with 10 recommendations offered by the authors. (Findings too extensive to select certain ones for notation here.)

4234. **WENRICH, RALPH C.** *The Role of the Administrator in the Future Development of Trade and Industrial Education.* Staff Research, 1959, 15 p., Department of Vocational Education and Practical Arts, The University of Michigan (Ann Arbor)

Purpose of Study: To validate a number of assumptions about the nature, extent, and organization of trade and industrial education programs in the future as a basis for predictions regarding administration.

Source of Data and Method of Study: A random sample of the membership of the National Council of Local Administrators of Vocational Education and Practical Arts and of principals of high schools with an enrollment of 1,000 or more in the North Central Association of Secondary Schools and Colleges was sent a questionnaire listing a number of assumptions and supporting reasons for each. Respondents were asked to indicate degree of agreement or disagreement with these statements.

Findings and Conclusions: The following assumptions were considered valid on the basis of reactions from vocational administrators and high school principals: (1) that there will be an expansion of the trade and industrial education programs in the public schools of the United States; that the growth will be both in quantity and in quality; (2) that this expansion will take place mostly in larger units of school administration, including county, area, and, in some cases, State-operated schools; (3) that the expansion in trade and industrial education programs will come in both the large comprehensive high schools and in specialized vocational and technical schools, with the trend in the direction of the latter, and these same schools will not only provide trade and industrial education for youth but will also serve adult tradesmen and industrial workers; (4) that the major emphasis in trade and industrial education will be on the post-high school level, including part-time and evening trade preparatory and extension classes, part-time technical programs, and full-time programs for the preparation of technicians in community and junior colleges and in technical institutes.

4235. **WRIGHT, LAWRENCE S.** *An Experiment in 33:10, General Drawing (An Attempt to Find Ways to Make More Efficient Use of the Instructor and to Improve the Course of Instruction).* Staff Research, 1959, 158 p. L. Iowa State Teachers College, (Cedar Falls)

Purposes of Study: To investigate the possibility of teaching more students in general drawing, with less time devoted to the supervision of students in the drawing room than had been the practice in the past. To use a qualified graduate assistant in the supervision of some sections of this course to ascertain whether his services in this regard would compare favorably with those of the regular instructor.

Source of Data and Method of Study: The parallel or matched-group method was used, with an experimental factor of one 50-minute period per week of supervised laboratory time being compared with a control factor of three 50-minute periods per week of supervised laboratory time. The effectiveness of a graduate student and a regular instructor were compared with respect to supervising the laboratory groups. Student achievement, student attitude, and instructor attitude were examined. In addition to grades assigned, data were gathered from responses made by students to a student-reaction sheet and by instructors to an instructor-reaction sheet. Average weighted ratings were derived from the responses to the reaction sheets.

Findings and Conclusions: No significant differences were found between the experimental and control factors when grades on all drawing problems were compared, when grades on all examinations were compared, or when final grades based on both drawing problems and examinations were compared. Attitudes of the control and experimental groups were found to be significantly different on only 5 of the 32 items on the student reaction sheet. Instructor reaction appeared to be that although there are both advantages and disadvantages in one period per week of supervised laboratory work, there were also advantages and disadvantages peculiar to three such periods per week. Either plan may be used with success. Neither the achievement nor the attitude of students who had the graduate assistant as their laboratory supervisor was found to be significantly different from that of students supervised in the laboratory by the regular instructor.

PART II

Authors of Doctoral Studies, 1930–55

NOTE: The abstract of each study can be found in the 1930–55 edition of *Research in Industrial Education: Summaries of Studies*, in which it is listed according to the number appearing at the end of the entry in the following list. L. indicates availability in the library of the institution mentioned; * indicates availability on microfilm.

ABRAMSON, BERNARD. Ph. D. *A comparison of two methods of teaching.* 1950, New York University L.* 1798

ADAMS, JOHN VOSE. Ed. D. *Science demonstration for the industrial arts shops.* 1947, New York University, School of Education. 1799

ADAMS, ORVILLE D. Ed. D. *A plan for vocational education in San Francisco.* 1952, Stanford University (Stanford, Calif.) L. 412

ADAMS, ROBERT WAYNE. Ed. D. *Educational needs of residents of electrified farms concerning the use of electricity.* 1947, University of Missouri. 1145

ALLEN, WILSON S. *Industrial education for Negroes in secondary schools in Florida with special reference to industrial arts education.* 1936, The Ohio State University. 2529

ANDERSON, HERBERT ADOLPH. Ed. D. *Analysis of content of woodworking textbooks based on research findings of the forest products laboratory.* 1953, University of Missouri (Columbia) L. 3236

ANDERSON, RAY N. Ph. D. *The disabled man and his vocational adjustment: A study of the types of jobs held by 4,404 orthopedic cases in relation to specific disability.* 1932, Teachers College, Columbia University. 3734

ANDERSON, W. CARLISLE. Ph. D. *Student teaching in industrial arts education.* 1954, University of Minnesota (Minneapolis) L.* 2533

AKEY, WAYNE WILBUR. Ed. D. *Student opinions which underlie the selection of a vocation.* 1952, University of California (Berkeley) L. 2527

ANDERWALD, CARL JOSEPH. Ph. D. *National defense training program for preemployment machine shop practice in central New York State.* 1947, Cornell University. 1453

ARNOLD, FRANK J. Ph. D. *Is vocational cooperative work in New York City schools a success or a failure?* 1932, New York University School of Education. 3602

ASHBROOK, WILLIAM D. Ph. D. *The development of industrial education in the schools of Pennsylvania.* 1944, University of Pittsburgh. 803

ASHLEY, LAWRENCE F. *Industrial arts education in teacher education.* 1936, The Ohio State University. 2999

ATTEBERRY, PAT H. Ed. D. *Nature and amount of preemployment training needed for entry occupations in the Kansas City labor market area.* 1954, University of Missouri (Columbia) L. 2912

AXELROD, AARON. Ed. D. *A course of study in applied science for machine-shop apprentices.* 1951, New York University (New York) L. 3536

BAAB, CLARENCE T. Ed. D. *Analysis, development and organization of a program for the preparation of industrial arts teachers at Colorado State College of Education.* 1950, Pennsylvania State College (State College) L. 139

BADER, LOUIS. Ph. D. *Survey of course construction for sales training in the electrical industry.* 1932, New York University, School of Education. 3672

BAILY, ATHOL ROMAYNE. Ed. D. *Evolving concepts of industrial education in the thinking of organized industrial management,* 1949, University of Missouri (Columbia) L. 3382

BAKER, ALFRED ELMORE. Ed. D. *A survey and analysis of senior high school practical and applied arts offerings to determine the content which may be utilized in pre-employment trade education.* 1943, University of California (Berkeley). 3003

BARLOW, MELVIN L. Ed. D. *A history of trade and industrial education in California.* 1949, University of California at Los Angeles. 804

BARNETTE, W. LESLIE, Jr. Ph. D. *Occupational aptitude patterns of counseled veterans.* 1949, New York University (New York), and Library of Congress. 673

BASKIN, SAMUEL. Ph. D. *The graduate of the college work-study program.* 1954, New York University (New York) L. 3788

BATESON, ROBERT EDWARD. Ed. D. *A study of the growth and development of the Teacher Training Program for vocational-industrial education in Connecticut.* 1951, New York University (New York) L.* 806

BATESON, WILLARD M. Ph. D. *The determination of standards for industrial-arts laboratories.* 1954, University of Michigan (Ann Arbor) L.* 2051

BAUER, CARLTON EDWARD. Ph. D. *A study of the arts and crafts movement and of art nouveau in relation to industrial arts design.* 1955, New York University (New York) L.* 807

BEACH, CHARLES KENNETH. Ph. D. *A study of certain factors which have bearing upon the prediction of success in shop courses in a technical and industrial school.* 1941, Cornell University. 2348

BEDNAR, ERNEST G. Ed. D. *Public school maintenance, installation, and construction jobs performed by or under the direction of industrial arts teachers.* 1955, University of Missouri (Columbia) L.* 2777

BERGENGREN, ROY F., Jr. Ed. D. *Some components of current leadership in industrial arts teacher education.* 1953, University of Florida (Gainesville) L. 140

BERGVIN, PAUL EMILE. Ed. D. *An evaluation of corporation-independent and public school-corporation cooperative apprentice schools.* 1945. Indiana University. 3539

BIBB, HERMAN LEON. Ed. D. *Private trade schools operating in Missouri from 1944 through 1951.* 1952, University of Missouri (Columbia) L.* 403

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PART III

Subject Index

NOTE: Included are the studies summarized in part I of this publication and studies 1 through 3801, which were published in Vocational Bulletin No. 264, *Research in Industrial Education: Summaries of Studies, 1930–1955*. Studies significant to more than one subject are cross-referenced.

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1930–55: 3, 21, 29, 38, 59, 76, 138, 141, 144, 149, 151, 157, 160, 161, 164, 165, 172, 181, 195, 196, 197, 200, 201, 205, 209, 212, 214, 215, 217, 230, 231, 248, 260, 278, 293, 302, 303, 326, 343, 345, 347, 348, 354, 356, 357, 358, 361, 369, 370, 371, 372, 376, 383, 389, 402, 405, 406, 407, 411, 414, 422, 424, 428, 430, 448, 463, 464, 472, 482, 494, 500, 527, 531, 557, 640, 642, 658, 676, 711, 798, 808, 820, 829, 831, 833, 840, 859, 863, 869, 880, 889, 891, 899, 905, 908, 927, 936, 939, 940, 949, 965, 976, 985, 990, 1005, 1015, 1017, 1027, 1029, 1042, 1047, 1054, 1065, 1091, 1132, 1148, 1153, 1169, 1195, 1203, 1207, 1223, 1228, 1232, 1233, 1287, 1308, 1315, 1321, 1368, 1379, 1393, 1407, 1410, 1423, 1440, 1455, 1492, 1511, 1569, 1604, 1701, 1707, 1712, 1715, 1744, 1752, 1767, 1771, 1779, 1783, 1883, 2049, 2050, 2053, 2058, 2062, 2063, 2064, 2066, 2071, 2072, 2074, 2075, 2076, 2077, 2082, 2096, 2119, 2528, 2539, 2541, 2545, 2548, 2552, 2553, 2554, 2559, 2560, 2563, 2564, 2566, 2569, 2572, 2573, 2574, 2575, 2580, 2583, 2585, 2586, 2587, 2591, 2593, 2594, 2595, 2596, 2597, 2599, 2600, 2602, 2604, 2605, 2606, 2607, 2610, 2612, 2613, 2616, 2618, 2620, 2624, 2627, 2629, 2630, 2634, 2637, 2638, 2640, 2641, 2647, 2648, 2652, 2653, 2654, 2660, 2665, 2669, 2670, 2671, PROGRAM STATUS—Continued

Master's—Continued

2675, 2676, 2681, 2682, 2687, 2690, 2691, 2694, 2700, 2702, 2706, 2708, 2715, 2716, 2718, 2720, 2721, 2722, 2725, 2726, 2728, 2730, 2731, 2734, 2736, 2737, 2738, 2740, 2741, 2744, 2746, 2747, 2748, 2751, 2752, 2753, 2754, 2755, 2758, 2759, 2761, 2762, 2764, 2765, 2766, 2767, 2770, 2771, 2772, 2773, 2776, 2778, 2780, 2782, 2783, 2786, 2787, 2796, 2798, 2799, 2804, 2805, 2806, 2814, 2817, 2819, 2820, 2822, 2823, 2824, 2826, 2831, 2833, 2834, 2835, 2837, 2841, 2842, 2844, 2846, 2848, 2849, 2850, 2852, 2853, 2854, 2855, 2856, 2857, 2861, 2862, 2864, 2865, 2866, 2868, 2869, 2874, 2875, 2879, 2880, 2885, 2888, 2889, 2890, 2891, 2893, 2894, 2895, 2898, 2901, 2903, 2905, 2908, 2910, 2923, 2924, 2927, 2951, 2956, 2960, 2966, 2969, 2974, 2982, 2983, 2984, 3000, 3015, 3029, 3032, 3061, 3079, 3087, 3121, 3128, 3167, 3176, 3199, 3212, 3214, 3227, 3342, 3413, 3414, 3432, 3445, 3469, 3478, 3490, 3504, 3505, 3506, 3549, 3573, 3584, 3593, 3596, 3599, 3614, 3615, 3624, 3625, 3627, 3630, 3633, 3635, 3656, 3667, 3699, 3713, 3717, 3743, 3747, 3764, 3797

1956–59: 3924, 3925, 3926, 3929, 3937, 3938, 3947, 3953, 3959, 3960, 3965, 3968, 3980, 3981, 3983, 3986, 3999, 4008, 4020, 4029, 4037, 4048, 4051, 4055, 4062, 4064, 4081, 4082, 4087, 4098, 4116, 4125, 4140, 4143, 4145, 4146, 4149, 4150, 4153, 4154, 4159, 4166, 4167, 4170, 4171, 4179, 4183, 4190, 4194, 4195, 4204, 4212, 4221, 4224

Staff

1930–59: 4231, 4233

SAFETY EDUCATION

Doctor's

1930–55: 396, 2234, 2235, 2241, 2247, 2253, 2262, 2263

1956–59: 3852, 3912

Master's

1930–55: 45, 377, 380, 382, 384, 395, 1243, 1947, 2136, 2230, 2231, 2232, 2233, 2236, 2237, 2238, 2239, 2240, 2243, 2244, 2245, 2246, 2248, 2249, 2251, 2252, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2306

1956–59: 3932, 3988, 4006, 4015, 4065, 4211

SHOP ORGANIZATION AND MANAGEMENT

Doctor's

1930–55: 105, 247, 259, 579, 2051, 2130, 2222, 2229, 3160

1956–59: 3809, 3817, 3871

Master's

1930–55: 49, 56, 64, 69, 98, 101, 102, 108, 112, 113, 115, 116, 118, 121, 124, 130, 132, 252, 270, 285, 492, 515, 516, 517, 518, 520, 525, 529, 530, 533, 534, 535, 540, 544, 547, 549, 550, 551, 554, 555, 561, 564, 565, 566, 567, 573, 578, 583, 584, 805, 875, 1061, 1178, 1226, 1268, 1339, 1347, 1476, 1605, 1775, 1809, 1868, 2221, 2223, 2225, 2227, 2300, 2303, 2305, 2310, 2327, 2329, 2330, 2336, 2338, 2339, 2352, 2537, 2688, 2768, 2793, 2797, 3154, 3169, 3262, 3500

1956–59: 3967, 4049, 4059, 4079, 4156, 4161, 4209, 4211

SHOP PLANNING

Doctor's

1930–55: 253, 2130

Master's

1930–55: 86, 90, 94, 97, 239, 240, 242, 243, 244, 246, 250, 251, 257, 258, 263, 266, 267, 269, 272, 274, 275, 276, 278, 279, 280, 281, 282, 283, 284, 286, 439, 522, 526, 530, 536, 537, 538, 543, 545, 546, 556, 559, 560, 562, 563, 569, 571, 575, 576, 577, 580, 585, 587, 588, 805, 917, 1332, 1536, 1573, 1781, 2118, 2125, 2176, 2224, 2278

1956–59: 3972, 4068

TEACHER EDUCATION

Doctor's

1930–55: 139, 140, 146, 163, 166, 168, 169, 170, 173, 188, 189, 208, 216, 219, 233, 234, 819, 1780, 2060, 2092, 2455, 2489, 2533, 2646, 2818, 2830, 2832, 2999, 3018, 3047, 3048, 3049, 3072, 3075, 3076, 3085, 3107, 3108, 3114, 3116, 3118, 3142, 3149, 3153, 3171, 3185, 3189, 3193, 3333, 3338, 3349, 3792

1956–59: 3802, 3806, 3811, 3814, 3817, 3820, 3824, 3829, 3830, 3831, 3839, 3841, 3843, 3853, 3855, 3863, 3871, 3877, 3882, 3887, 3897, 3898, 3905, 3908, 3910

Master's

1930–55: 52, 114, 137, 143, 145, 147, 148, 150, 153, 154, 155, 159, 161, 162, 174, 175, 176, 179, 180, 183, 184, 187, 191, 192, 193, 199, 203, 204, 206, 207, 209, 211, 218, 220, 221, 226, 228, 235, 296, 297, 301, 302, 319, 380, 384, 622, 678, 680, 798, 855, 966, 967, 1012, 1016, 1031, 1036, 1457, 1705, 1729, 1811, 1821, 1871, 1922, 1957, 2009, 2015, 2016, 2017, 2019, 2022, 2025, 2028, 2029, 2035, 2054, 2061, 2112, 2125, 2131, 2132, 2140, 2153, 2179, 2298, 2323, 2333, 2360, 2534, 2544, 2546, 2547, 2565, 2567, 2568, 2572, 2591, 2613, 2621, 2622, 2629, 2635, 2642, 2644, 2656, 2666, 2676, 2677, 2678, 2687, 2709, 2719, 2724, 2729, 2732, 2733, 2749, 2757, 2763, 2785, 2788, 2790, 2802, 2858, 2860, 2867, 2873, 2882, 2991, 2995, 2996, 3000, 3002, 3004, 3005, 3006, 3008, 3011, 3013, 3017, 3019, 3020, 3028, 3031, 3034, 3036, 3037, 3042, 3050, 3051, 3053, 3056, 3058, 3062, 3066, 3073, 3077, 3080, 3084, 3086, 3090, 3094, 3096, 3103, 3105, 3109, 3110, 3111, 3112, 3115, 3117, 3128, 3129, 3130, 3133, 3137, 3138, 3139, 3140, 3146, 3148, 3155, 3164, 3166, 3168, 3175, 3177, 3181, 3182, 3186, 3188, 3201, 3205, 3208, 3218, 3220, 3221, 3224, 3231, 3306, 3317, 3325, 3327, 3329, 3331, 3332, 3334, 3335, 3336, 3339, 3340, 3341, 3343, 3344, 3345, 3346, 3350, 3351, 3352, 3354, 3355, 3356, 3383, 3384, 3484, 3495, 3681, 3703, 3710, 3711, 3754, 3796, 3801

1956–59: 4023, 4031, 4038, 4058, 4071, 4076, 4077, 4115, 4127, 4131, 4133, 4136, 4152, 4156, 4191, 4193. 4198, 4223

Staff

1930–59: 4232

TESTING AND EVALUATION MATERIAL

Doctor's

1930–55: 412, 2093, 2095, 2348, 2361, 2367, 2372, 2379, 2400, 2405, 2415, 2419, 2433, 2464, 2466, 2467, 2482, 2483, 2650, 3009, 3438, 3690, 3705, 3772

1956–59: 3810, 3813, 3815, 3832, 3839, 3841, 3843, 3855, 3857, 3874, 3911

Master's

1930–55: 1340, 1378, 1446, 1454, 1630, 1737, 1961, 2052, 2055, 2059, 2069, 2073, 2083, 2268, 2297, 2301, 2302, 2308, 2311, 2313, 2315, 2316, 2318, 2319, 2321, 2324, 2326, 2333, 2341, 2346, 2347, 2349, 2351, 2353, 2354, 2365, 2366, 2369, 2370, 2373, 2374, 2378, 2381, 2382, 2384, 2385, 2390, 2391, 2392, 2394, 2403, 2408, 2409, 2414, 2416, 2424, 2428, 2434, 2435, 2437, 2438, 2440, 2443, 2445, 2446, 2447, 2449, 2457, 2460, 2461, 2463, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2478, 2480, 2484, 2487, 2490, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2504, 2505, 2511, 2512, 2514, 2516, 2517, 2518, 2520, 2522, 2523, 2525, 2571, 2906, 3043, 3070, 3098, 3170, 3190, 3308, 3326, 3337, 3586

1956–59: 3923, 3924, 3936, 3941, 3949, 4004, 4030, 4044, 4052, 4060, 4074, 4083, 4090, 4151, 4158, 4160, 4188, 4196, 4199, 4201, 4202, 4216, 4219, 4228, 4229

TRAINING WITHIN INDUSTRY

Doctor's

1930–55: 2038, 2097, 2099, 3487, 3676, 3678, 3683, 3684, 3685, 3694, 3709, 3728

1956–59: 3850, 3878, 3889, 3896

TRAINING WITHIN INDUSTRY—Con.

Master's

1930–55: 412, 2081, 2540, 3309, 3475, 3489, 3535, 3547, 3582, 3590, 3671, 3673, 3679, 3680, 3686, 3696, 3697, 3702, 3704, 3706, 3714, 3718, 3720, 3721, 3722, 3723

1956–59: 4014

VOCATIONAL GUIDANCE

Doctor's

1930–55: 35, 598, 608, 612, 626, 631, 673, 674, 692, 717, 757, 762, 781, 783, 788, 2356, 2383, 2444, 2450, 2462, 2488, 2502, 2519, 2527, 2704, 2714, 3165, 3232, 3617, 3665, 3690

1956–59: 3856, 3883

Master's

1930–55: 117, 171, 324, 366, 589, 590, 591, 592, 593, 595, 596, 597, 599, 600, 604, 605, 607, 609, 610, 611, 613, 614, 615, 616, 617, 618, 620, 621, 623, 624, 627, 628, 629, 630, 632, 633, 635, 636, 637, 638, 639, 640, 641, 643, 644, 645, 647, 648, 651, 652, 653, 654, 655, 656, 660, 661, 662, 663, 664, 666, 667, 668, 669, 670, 671, 672, 677, 678, 679, 681, 682, 686, 687, 702, 704, 710, 718, 725, 736, 744, 755, 758, 759, 760, 761, 766, 767, 770, 771, 775, 777, 779, 780, 785, 787, 789, 792, 793, 1090, 1104, 1112, 1369, 1489, 1637, 1713, 1714, 1756, 1785, 1924, 2057, 2070, 2087, 2103, 2152, 2342, 2343, 2344, 2345, 2350, 2351, 2357, 2359, 2360, 2362, 2363, 2368, 2370, 2371, 2376, 2378, 2380, 2382, 2386, 2387, 2388, 2391, 2395, 2397, 2398, 2404, 2407, 2410, 2412, 2413, 2417, 2418, 2420, 2422, 2423, 2425, 2427, 2428, 2429, 2430, 2432, 2436, 2441, 2442, 2448, 2451, 2453, 2454, 2458, 2459, 2477, 2479, 2481, 2485, 2486, 2501, 2503, 2505, 2506, 2507, 2510, 2513, 2515, 2521, 2535, 2779, 2881, 2900, 2904, 2967, 2994, 3001, 3060, 3078, 3083, 3089, 3092, 3119, 3158, 3194, 3195, 3206, 3302, 3316, 3321, 3347, 3348, 3404, 3434, 3463, 3473, 3483, 3550, 3580, 3595, 3600, 3601, 3646, 3687, 3735, 3749, 3750, 3766, 3776, 3790

1956–59: 3951, 3979, 4032, 4080, 4099, 4120, 4121, 4229

VOCATIONAL REHABILITATION

Doctor's

1930–55: 937, 3734, 3756, 3768, 3779, 3782, 3785

1956–59: 3838

Master's

1930–55: 613, 725, 906, 951, 2108, 2611, 3623, 3626, 3628, 3629, 3631, 3634, 3737, 3739, 3746, 3750, 3751, 3752, 3753, 3757, 3758, 3761, 3762, 3767, 3769, 3770, 3773, 3774, 3781, 3783

1956–59: 3940, 4056, 4070, 4208

MISCELLANEOUS

Doctor's

1930–55: 58, 93, 316, 765, 1739, 3282, 3373

1956–59: 3807, 3811, 3842, 3854, 3857

Master's

1930–55: 15, 352, 542, 586, 687, 815, 871, 1046, 1064, 1173, 1212, 1358, 1395, 1399, 1401, 1405, 1408, 1413, 1416, 1417, 1422, 1429, 1434, 1442, 1474, 1506, 1523, 1538, 1540, 1542, 1543, 1544, 1546, 1548, 1549, 1551, 1556, 1557, 1558, 1559, 1560, 1561, 1622, 1623, 1666, 1673, 1677, 1689, 1698, 1702, 1754, 1791, 1797, 1813, 1824, 1849, 1850, 1987, 2105, 2121, 2129, 2142, 2149, 2183, 2280, 2661, 2680, 2816, 2825, 3057, 3192, 3241, 3243, 3244, 3257, 3271, 3273, 3274, 3275, 3277, 3278, 3281, 3283, 3285, 3315, 3319, 3374, 3399, 3439, 3456, 3471, 3491, 3516, 3577, 3608, 3719, 3730

1956–59: 3945, 4017

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